DEPRESSIVE SYMPTOMS AMONG FOREIGN-BORN CHINESE, KOREAN, AND VIETNAMESE AMERICANS: THE INFLUENCE OF PERCEIVED DISCRIMINATION, PERCEIVED STRESS, AND PERCEIVED SOCIAL SUPPORT

by
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A dissertation submitted to Johns Hopkins University in conformity with the requirements for the degree of Doctor of Philosophy

Baltimore, Maryland

March, 2016

ABSTRACT

Mental health in the Asian population in the U.S. is overlooked in the overall public health agenda. This population is often seen as the "model minority" and as such believed to be in better health than they may actually be. Also, rarely is research in this population disaggregated by ethnic group resulting in findings that overgeneralize the Asian population. This thesis reviewed the current state of the Asian population in the U.S. with a special focus on depressive symptoms among foreign-born Asians of Chinese, Korean, and Vietnamese origin. Additionally, the research of this thesis sought to describe differences that may exist between Asian ethnic groups. All analyses of this thesis were conducted using a total sample of 600 foreign-born Asians, as well as on each of the three ethnic groups in sub-analyses by ethnic group. Multiple logistic regression was used to determine if perceived discrimination is associated with depressive symptoms among this population. Additionally, multiple linear regression analyses were conducted to determine if perceived social support and perceived stress act as mediators and/or moderators in the relationship between perceived discrimination and depressive symptoms. Results from this research has indicated that perceived discrimination is associated with depressive symptoms among a community-sample of foreign-born Chinese, Korean, and Vietnamese Americans. Similarly, perceived social support and perceived stress were both mediators in the relationship between perceived discrimination and depressive symptoms for both the total sample and when stratified by ethnic group. Also, perceived social support was not a moderator for the total sample or by ethnic group sub-analyses. However, perceived stress was a moderator of perceived discrimination's association with depressive symptoms for the total sample and only for the Vietnamese sample when stratified by ethnic group. This research indicated that

ethnic level analyses in the Asian population is worthwhile. Differences between the three Asian ethnic groups could be attributed to perceptions of discrimination and migration patterns.

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ACKNOWLEDGMENTS

I would like to thank several people for their support and guidance throughout this journey. First I would like to thank my advisors, Dr. Hee-Soon Juon and Dr. Janice Bowie for their endless support, advice, and example. Without their mentorship and expertise I would not have been able to complete this thesis. I am grateful for Dr. Juon for having me as an advisee from my first year and allowing me to work with her on her R01 grant, which this research is based on. Also, I would like to thank her for her example as one of the few researchers in public health that researches the health of the Asian population. Similarly, I appreciate Dr. Bowie's willingness to add me as an advisee at the beginning of my third year, and want to especially thank her for her constant words of encouragement given to myself and other students throughout my time as a PhD student in the Health, Behavior and Society (HBS) department. Additionally, I must thank my external thesis committee members, Dr. Joseph Gallo and Dr. Darrell Gaskin, for their kindness, patience, and input in this process. Likewise, I also thank my alternates Dr. Peg Ensminger, and Dr. Kelly Bower for their willingness and openness to serve and advise me as alternate members of my committee.

I also would like to thank faculty that have worked with me throughout the years of my doctoral training in different capacities, they include Dr. Melissa Davey-Rothwell, Dr. Paul Gaist, Dr. Deanna Kerrigan, Dr. Carl Latkin, Dr. Lori Leonard, Dr. Doug Storey, Dr. Karin Tobin, Dr. Carol Underwood, and Dr. Cui Yang. Their guidance has helped me grow as a student, researcher, teacher, and person. Also, thank you to our department chair Dr. David Holtgrave for his leadership and Mrs. Barbara Diehl, the HBS academic coordinator who has helped me time and time again with any and every question or concern I have had with the program.

In addition to the HBS faculty and staff, I could not have succeeded through this challenging program without the constant support and inspiration of my doctoral cohort, the HBS 2012 entering doctoral cohort. Each and every one of the members have contributed to my success in reaching this point. They have continued to inspire, challenge, motivate, and appreciate me in ways that are unique to themselves. I am grateful for them and the lifelong friendships that have been made from our shared experiences. I especially thank each of those who have acted as an "accountability buddy" throughout the dissertation process.

In addition, I must thank my family and friends who have supported me through these four years of schooling. I appreciate their patience, understanding, and love that they have given me. A special thanks to Ms. Katherine Lee and Mrs. Elaine Jones for their help and support as my non-cohort HBS friends. I would not have survived this program without their friendship and guidance. Also, thanks to all of my friends from back home and afar that have kept in contact with me and shared interest in my work. They have encouraged me during the tough times and shared with me their lives for many years; they mean so much to me. I also thank the new friends I have made in Baltimore since entering my doctoral program. I acknowledge that I am very lucky and thankful for all of my friends and their families. The greatest thanks is to my big family. Thank you to my nine nephews and nieces, "the juicers", who are without a doubt my greatest joy and who have always been the break I need when I need it. Thank you to my many siblings (blood and in-law) for the advice, laughs, and always taking care of me. Most of all, thank you to my parents who inspire me more than anyone I have ever met or known. Their sacrifices and history as Vietnamese immigrants who escaped the Vietnam War as

"boat people", has inadvertently led me to my interests in researching the Asian population and mental health. They are a constant inspiration and unmatchable example of overcoming obstacles. Also, thank you to Christopher O'Donnell who has endured me through the rollercoaster of writing a dissertation and has chosen to be my partner despite the long hours and stress that come with it. A most special thanks to him for his love and acceptance of me during this difficult journey.

Lastly, thank you to the funder (The National Institutes of Health), participants, research staff, and community members who made the parent study research possible.

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CHAPTER ONE: INTRODUCTION

Background

Asian population in the U.S.

The U.S. demography is quickly changing, with Asian immigrants entering as the fastest growing minority population in the U.S. (U.S. Census Bureau, 2012a). It is expected that by 2060, 9.3 percent of the total U.S. population will be of Asian heritage (U.S. Census Bureau, 2015). The picture of immigration to the U.S. painted today, depicts an image of overall acceptance of Asian refugees and other Asian migrants as compared to the legislation of the past. Throughout history, Asians were discriminated against in the form of refusal of entry into the U.S. until approximately 50 years ago with the 1965 Immigration and Nationality Act (University of Washington-Bothell, 2007). Principally, the Chinese Exclusion Act prohibited Chinese from immigrating to the U.S. in 1882, and continued with several other laws that prevented Asians from entering or becoming citizens (Schrecker, 2010; U.S. Department of State, 2013a, 2013b, 2013c). Since 1965 when the National Immigration Act was enacted and enforced, Asian immigration has catapulted in the U.S. (Min, 2011; Pew Research Center, 2015; U.S. Census Bureau, 2012b). However, due to the heterogeneity of the Asian population, it continues to represent an evolving and diverse group of people today.

Foreign-born population

Asians in the U.S., include both U.S.-born and foreign-born peoples. Many foreign-born Asians reside in the U.S. Approximately two in three Asians in the U.S. are foreign-born (Ramakrishnan & Ahmad, 2014). The five largest Asian populations in the U.S. are individuals with heritage from China, India, The Philippines, Vietnam, and

Korea (U.S. Census Bureau, 2012b). The U.S. Census Bureau reported that 11.6 million immigrants in 2011 were from Asia, representing a quarter of the total U.S. foreign-born population (U.S. Census Bureau, 2012b). U.S. Census Bureau data from 2010 shows that 27% of Asian foreign-born came to the U.S. prior to 2005, 30% arrived between 2005 and 2007, and the remaining 40% have arrived post 2008 (U.S. Census Bureau, 2011). This depicts the exponential growth in foreign-born Asians in the U.S. that is still to come.

English proficiency varies among foreign-born Asians. Foreign-born Asians with higher education are more likely to have better English than those with lower education (U.S. Census Bureau, 2014). Similarly, the longer a foreign-born has resided in the U.S. the better they are at speaking English (U.S. Census Bureau, 2014). A greater percentage of recently arrived foreign-born Asian population (arrived in 2000 or later) knew no English compared to the foreign-born Asians who arrived prior to 1980, 13% vs. 6% respectively (U.S. Census Bureau, 2014).

Foreign-born Asians migrate to the U.S. for specific reasons. In contrast to U.S.-born Asians, foreign-born Asians are particularly different than their U.S.-born counterparts due to the migration experience. Additionally, several factors contribute to a person's decision to emigrate from their mother country to the U.S. For Asian immigrants, one's ethnic heritage plays an important role in one's ability to immigrate to the U.S., and often due to a reason specific to that region or nation. For example, Vietnamese primarily immigrated to the U.S. in the past and today as a consequence of the Vietnam War. Thus, many Vietnamese have immigrated to the U.S. as refugees, which is notably different than someone who immigrated to the U.S. as a voluntary

migrant. Thus, these different factors associated with one's heritage could affect one's experience while acclimating to the U.S. These unique perspectives can influence one's experience while in the U.S., including one's mental health.

Immigration and mental health

Asian immigrants are pivotal to the Asian population in the U.S. because 1) they partially consist of Asian refugees who immigrate to the U.S., by definition, to escape conflict, and 2) they contribute to the increasing rate of this population group. Historically and currently, many Asian immigrants are refugees (U.S. Department of State, 2013d) and that have suffered from war, such as the Vietnamese, Laotian, Hmong, and Cambodian peoples, may have higher rates or earlier onset of Post-Traumatic Stress Disorder (PTSD) (Rasmussen, Crager, Baser, Chu, & Gany, 2012; U.S. Department of Health and Human Services [DHHS], 2012). In a national study of the Asian population, it was found that refugee immigrants to the U.S. experienced first onset of PTSD much earlier than voluntary migrants ($p<0.01$); the average time of onset of PTSD was nine years prior to immigrating to the U.S. for refugees, and seven years after immigrating to the U.S. for voluntary migrants (Rasmussen et al., 2012). This finding suggests that refugee status in the Asian population may relate to higher prevalence of mental disorders, e.g., PTSD, compared to voluntary migrants due to an earlier onset of disease. Thus, the migration experience is an important contributor to the mental health of an individual.

The immigrant experience is difficult to measure and capture in a study. However, studies that examine immigrant-related factors sometimes produce results indicating that immigrants have a distinct perspective (Takeuchi et al., 2007). For example, Vietnamese

immigrants have been shown to have significantly worse outcomes for vitality, energy, and fatigue when compared to non-immigrants (Fu & VanLandingham, 2012). Another study of Vietnamese refugees showed that premigration and postmigration experiences had different effects on adjustment and distress, where premigration traumatic experiences was associated with anxiety, while acculturation and social support as postmigration factors were associated with less distress (Birman & N. Tran, 2008). Another study of Southeast Asian refugees indicated that premigration trauma was positively correlated with psychological distress, and that greater than five years postmigration, the effect was significant. A study that explored the effect of migration among Chinese immigrant women in Canada showed that employment status and financial strain were significant predictors of their mental health (Tang, Oatley, & Toner, 2007). Thus, differences in mental disorder prevalence from the refugee Asian population compared to the U.S.-born Asian population may exist and should be further investigated in future studies.

Asian population in mental health research

It is widely known among mental health researchers that Asians have the lowest rate of utilization of mental health services when compared to their ethnic counterparts (Le Meyer, Zane, Cho, & Takeuchi, 2009; DHHS, 2001). Several studies focusing on East Asian subpopulations have shown that rates are much lower possibly due to cultural perceptions of mental health illness (Atkinson & Gim, 1989; Yang, Phelan, & Link, 2008). For instance, shame and stigma have been found to be barriers to seeking care for Asian Americans (Ho, 1984; T. Y. Lin, Tardiff, Donetz, & Goresky, 1978; Tabora & Flaskerud, 1997; Webster & Fretz, 1978). The idea of saving face is popular among

some Asian cultures, and the collective ideology of most Asian cultures versus the individualistic ideology of Americans has been believed to be a significant proponent in deterring Asian Americans from seeking care (T. Y. Lin et al., 1978; Tabora & Flaskerud, 1997; Webster & Fretz, 1978). Researchers have suggested that some Asian cultures do not perceive mental health in the same way that American or Western cultures perceive mental health (Chu & Sue, 2011; DHHS, 2001). On the contrary, mental health may not be acknowledged as a separate entity in Asian cultures, but instead as a portion of the mind, body, soul (Leong & Lau, 2001). Mental illness takes on the form of several culture-bound syndromes in particular cultures, and mental illness is often stigmatized (Sue, Yan Cheng, Saad, & Chu, 2012).

As previously mentioned, language is also a major barrier for many Asian Americans when seeking health care (Leong & Lau, 2001; Sue et al., 2012). A lack of health care providers that speak the native language of an Asian immigrant, as well as a lack of understanding the cultural norms and language of an Asian immigrant, as with any immigrant, may result in lower patient satisfaction (Ngo-Metzger et al., 2007). Variation in the English fluency exists between Asian ethnic groups. The Migration Policy Institute's 2012 analysis of the U.S. Census Bureau's American Community Survey (ACS) data showed that roughly over two-thirds (68%) of the foreign-born Vietnamese population who were 5 years old or older in the U.S. were Limited English Proficient (LEP), which was lower than the total 47% LEP foreign-born from South Eastern Asia (Rkasnuam & Batalova, 2014). In comparison, in 2013, 53% of foreign-born Koreans (five years old and older) were LEP, while the total foreign-born population was 50% LEP (Zong & Batalova, 2014). Of foreign-born Chinese (five years

old and older) in 2013, 62% were LEP (Hooper & Batalova, 2015). Limited English Proficiency was described as those who spoke English less than "very well". Limited English proficiency has been linked to poorer health outcomes in Asians. Related to English fluency is the year of migration to the U.S., Chinese are the earliest mass migration of Asian peoples to the U.S., and thus some families have been living in the U.S. for many generations. Contrarily, those from Vietnam have the earliest immigrants arriving around the mid-1970s. Thus, it is likely that a greater proportion of Vietnamese compared to Chinese are not fluent in English. Thus, there are clear differences in Asian ethnic groups that migrate to the U.S. Knowing whether these differences influence health outcomes, particularly mental health, is not yet fully understood by researchers.

Depression

Depression is a worldwide disease and affects all types of people. Unfortunately, it is a leading contributor to morbidity in the world. An excess of 350 million people are affected with depression in a year (World Health Organization [WHO], 2012). It is estimated that the costs of depression in the U.S. grew to nearly 53 billion dollars in 2000 from 47 billion dollars in 1990 (Greenberg et al., 2003). However, where one lives can certainly influence depression prevalence. For instance, depression in developing nations is different than depression in first world countries. The lack of resources and workforce capacity for poorer nations results in an inability to provide mental health care for those in need (Kakuma et al., 2011). Likewise, underreporting and under diagnosis are likely to be common since other communicable diseases may be of greater concern for the population.

On the contrary, the U.S. is the richest nation in the world and spends the most money on healthcare than any other nation (Reinhardt, Hussey, & Anderson, 2004). In the U.S. depression affects 1 in 13 people aged 12 or older (Pratt & Brody, 2014). Yet, even with resources available, it is estimated that only 35% of people afflicted with severe depression do seek care from a mental health professional (Pratt & Brody, 2014). This is likely linked to the stigmatization of mental illness worldwide (WHO, 2012). In the U.S., women are 70% more likely to experience depression than men at some point in their life (National Institute of Mental Health [NIMH], 2015). Those who are 40 – 59 have the highest prevalence of depression compared to other age groups (Pratt & Brody, 2014).

Depression in the Asian population

In the Asian population, depression is not well understood. In 2002 – 2003, the National Latino and Asian American Study (NLAAS) was conducted and became the first national study in the U.S. to target Latino and Asian ethnic groups regarding mental health outcomes. The study showed that the Asians (Chinese, Vietnamese, and Filipino, and a small "Other Asian" group) sampled had lower prevalence for depressive disorders than Latinos, Blacks, and Whites when compared to the NLAAS data for Latinos (Alegría et al., 2007), National Survey of American Life (NSAL) for Blacks (Williams et al., 2007), and the National Comorbidity Survey (NCS) for Whites (Breslau et al., 2006). Several studies have used the data from this national study to provide insight into the Asian population.

Community-based studies have been conducted since the 1980s to examine depression of the Asian population (Kuo, 1984; Ying, 1988). Many studies of Asian

populations for depression focuses on Chinese or Korean populations. A meta-analysis by H. J. Kim, Park, Storr, Tran, and Juon (2015) showed that the majority of studies were focused on these populations. Research has also shown that depression findings for the Asian population are mixed. In addition, studies stratified by Asian ethnic group are limited. However, of those studies that do exist, a range of depression prevalence has been reported. Of particular interest is that some community-based studies have shown incredibly high prevalence of depression among samples of Asian populations. For example, a study of Korean female caregivers reported that the prevalence of depression for the caregivers was 71.0% when using the Centers for Epidemiologic Studies-Depression Scale (CES-D) (E. E. Lee & Farran, 2004). Another study that used Korean adults showed that 48.0% of participants had depression (Park & Rubin, 2012). Thus, it is important that researchers better understand the extent to which depression plagues this population, so that efforts to treat this debilitating disease can be tackled.

Factors associated with depression

Several factors are associated with depression. For instance, depression has shown to be comorbid with other mental disorders such as anxiety disorders, substance use disorders, and serious medical conditions such as heart disease, stroke, cancer, etc. (NIMH, 2015). Likewise, diabetes, and other chronic diseases have been linked to depression (U.S. Centers for Disease Control and Prevention [CDC], 2012a). Though health diseases such as obesity may be linked with depression, other social and behavioral factors may also be linked to depression. For instance, studies in psychology have focused on stress and its impact on mental health. Additionally, perceived discrimination has been studied to determine if it is related to negative health outcomes

including depression. Likewise, perceived social support has been studied to determine if it protects individuals against negative health outcomes such as depression. Particularly among the Asian population, and even more so, among the foreign-born Asian population, research targeting depression and the social and behavioral factors that are associated with it are lacking.

Depression is a widely studied topic in the mental health and public health field overall. However, an understanding of depression among foreign-born Asians in the U.S. is limited. Additionally, three important social constructs linked to depression have been studied in other populations, but minimally for Asians. Thus these three factors of primary interest for this research are perceived discrimination, perceived stress, and perceived social support.

Perceived Discrimination

Discrimination is described as "the practice of unfairly treating a person or group of people differently from other people or groups of people" (Merriam-Webster, 2015a) or as the National Research Council defined, "differential treatment on the basis of race that disadvantages a racial group" and "treatment on the basis of inadequately justified factors other than race that disadvantages a racial group" (Dabady, Blank, & Citro, 2004, p. 4 and 39). Discrimination has shown to affect mental health in a variety of ways (Kessler, Mickelson, & Williams, 1999; Yip, Gee, & Takeuchi, 2008). Perceived discrimination is the perception of being discriminated against by an individual. For example, perceived discrimination can negatively impact one's decision to use mental health services among the Asian population (Huang, Appel, & Ai, 2011; Spencer & Chen, 2004). Additionally, higher levels of perceived discrimination have been linked to

more stress and a greater likelihood of reporting depressive symptoms (Gee, Spencer, Chen, & Takeuchi, 2007).

Researchers investigated the relationship between everyday discrimination and psychological distress among Filipino, Vietnamese, and Chinese Americans (immigrants and U.S.-born) and found that perceived discrimination is positively associated with psychological distress (W. Zhang & Hong, 2012). Additionally, this study showed that Vietnamese Americans perceived discrimination the least when compared to Filipino and Chinese Americans. Chinese Americans reported the greatest amount of distress when compared to the other two Asian ethnic groups. Another study showed that family support acted as a buffer against discrimination (Chae, Lee, Lincoln, & Ihara, 2012). Thus, following past research it appears that perceived discrimination is correlated to psychological distress among several Asian ethnic groups.

Perceived Stress

Stress is "a state of mental tension caused by problems in your work, life, etc." (Meriam-Webster, 2015b). It has long been shown that there is a correlation between stress and mental health, suggesting that more stress can lead to poorer mental health outcomes (Brown & Harris, 1978; Dohrenwend & Dohrenwend, 1974; Lazarus & Folkman, 1984; Pearlin, 1989). Thus, a common correlate of mental health among researchers in this field is stress. As is the case with many studies, constructs may not always be explicitly defined, and often are measured using a multitude of measures. Within the early literature, stress is more broadly described as "stress" (Brown & Harris, 1978; Dohrenwend & Dohrenwend, 1974; Lazarus & Folkman, 1984; Pearlin, 1989),

while at other times and often more recently it may be specified as "acculturative stress" (Berry, Kim, Minde, & Mok, 1987; J. Kim & H. Kim, 2013; J. Kim, Suh, S. Kim, & Gopalan, 2012; Miller, Yang, Farrell, & Lin, 2011; Torres & Rollock, 2004; Xu & Chi, 2013). Acculturative stress is defined as the stress that is created from one's attempt to adjust to a new culture (Berry et al., 1987; Torres & Rollock, 2004). More specifically, it is understood to be, "a reduction in mental health and well-being of ethnic minorities that occurs during the process of adaptation to a new culture" (Lueck & Wilson, 2010, p. 48). Higher acculturative stress has been correlated with worse depression scores among Korean elderly immigrants (Han, Kim, Lee, Pistulka, & Kim, 2007; Pang, 1998; Stokes, Thompson, Murphy, & Gallagher-Thompson, 2002).

Perceived Social Support

Perceived social support is the support given to an individual by a social tie, and can be defined as emotional, instrumental, tangible, or informational support (House, Kahn, McLeod, & Williams, 1985). Research has shown that social support can be beneficial to one's health, specifically by reducing one's acculturative stress and depression (Chae et al., 2012; Han et al., 2007; Mui, 2000; Sangalang & Gee, 2012; Yeh & Inose, 2003). Specifically, research has shown that adult children are the most important form of support for Korean elders, even more so than co-habiting spouses (Han et al., 2007). While another study of Chinese immigrant women in Canada showed that social support was not significantly associated with mental health outcomes (Tang et al., 2007). A study conducted in Vietnam showed that social support in the form of emotional support was significantly and positively associated with depressive symptoms among a sample of 600 individuals aged 55 and older. Thus, a mix of results related to social

support and its potential role in affecting mental health status among different Asian ethnicities exists. The literature is not yet well-developed in defining the role of social support for each Asian ethnic group.

Covariates

Studies have shown that a variety of social factors influence depressive symptoms, including employment status, years in the U.S., English proficiency, age, gender, SES, religiosity, and others (Ai, Huang, Bjorck, & Appel, 2013; Mui & Lee, 2013; Tran, Manalo, & Nguyen, 2007). Acculturation has been shown to be linked to depressive symptoms, with lower acculturation being associated with higher depressive symptoms among immigrants (Berry et al., 1987; Chiriboga, Black, Aranda, & Markides, 2002; Jang, Kim, & Chiriboga, 2005; Myers & Rodriguez, 2003).

The NLAAS data suggests that there are differences in lifetime depression comparing the Asian population by nativity, stating that those who were U.S.-born women had double the amount of lifetime depression cases compared to their Asian immigrant counterparts (Lau et al., 2013). However, a contrasting finding from John, de Castro, Martin, Duran, and Takeuchi (2012) found that immigrants compared to their U.S. born counterparts had reported worse outcomes for mental health, yet they had lower odds of having a mental disorder and anxiety. This suggests that subjective measures to reporting mental health may differ based on nativity status. Additionally, length of residence (how long one has been living in the U.S.) has shown to be important in predicting depressive symptoms. A study of Vietnamese immigrants demonstrated that length of residence was the strongest predictor of depression among a community sample (Tran et al., 2007). Furthermore, this study illustrated that individuals who lived in the

U.S. 12.5 years or less had higher depression levels compared to those who had been living in the U.S. beyond 12.5 years. This suggests that it could require more than a decade for immigrants or refugee immigrants to adjust to their new country. Lastly, another study of Korean immigrants compared three age-based groups in a community sample (elderly, middle-aged, and young adults). For the Korean elderly immigrant population, religion was a significant predictor of depressive symptoms (Mui & Lee, 2013), while predictors of higher depressive symptoms included lower income, higher stress, and not living with one's children (Y. M. Lee & Holm, 2012). Therefore, a variety of social factors may affect the outcome of one's depressive symptoms.

In summary, there is a vast literature on perceived discrimination, perceived stress, perceived social support, and depressive symptoms. It has been shown that perceived discrimination, perceived stress, and perceived social support are linked with depression. However, it is not well understood how perceived discrimination, perceived stress, and perceived social support interplay to affect depression; this literature is at the beginning stages. Few researchers have attempted to examine potential differences among different Asian ethnic groups, regarding these three constructs and how they relate to depressive symptoms, with a greater paucity of literature on the foreign-born Asian population. Therefore, future studies should also investigate the mediating and moderating roles of these constructs as they relate to an outcome of depressive symptoms for a foreign-born Asian population, and should stratify by ethnic group to examine differences at the ethnicity level.

Rationale for Research

To my knowledge, there are no community-based studies that compare the differences in depressive symptoms between Chinese, Korean, and Vietnamese immigrants in the U.S. As the Asian population grows, it is imperative to more accurately understand their mental health status and the associated needs, particularly among three of the most populous Asian ethnic groups in the U.S. It is well established that low rates of mental services are exhibited by the Asian population. Therefore, this research seeks to provide a critical review of the Asian population's mental health in the U.S., as well as to determine if perceived discrimination, perceived stress, and perceived social support affect one's outcome of depressive symptoms among an Asian foreign-born sample. Additionally, it seeks to reveal if ethnic group differences exist between these three groups. Efforts to disaggregate data by ethnic group when feasible, allows for nuanced differences to be recognized and appreciated. Thus, findings from this research could lead to other studies of the Asian population by ethnic group, allowing for more targeted approaches to prevention, diagnosis, and treatment.

Thesis Aims

This research study sought to identify if perceived discrimination, perceived stress, and perceived social support influence one's depressive symptoms in a foreign-born Chinese, Korean, and Vietnamese population residing in the Baltimore-Washington metropolitan area.

The thesis aims were:

Aim 1: To determine if perceived discrimination is associated with depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

Aim 2: To determine if perceived social support and perceived stress partially mediate the relationship between perceived discrimination and depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

Aim 3: To determine if perceived social support and perceived stress moderate the relationship between perceived discrimination and depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

All aims were conducted on a total sample representing the three ethnic groups aggregated. Also, sub-analyses by ethnic group was conducted for each aim.

Figure 1.1. Conceptual Framework

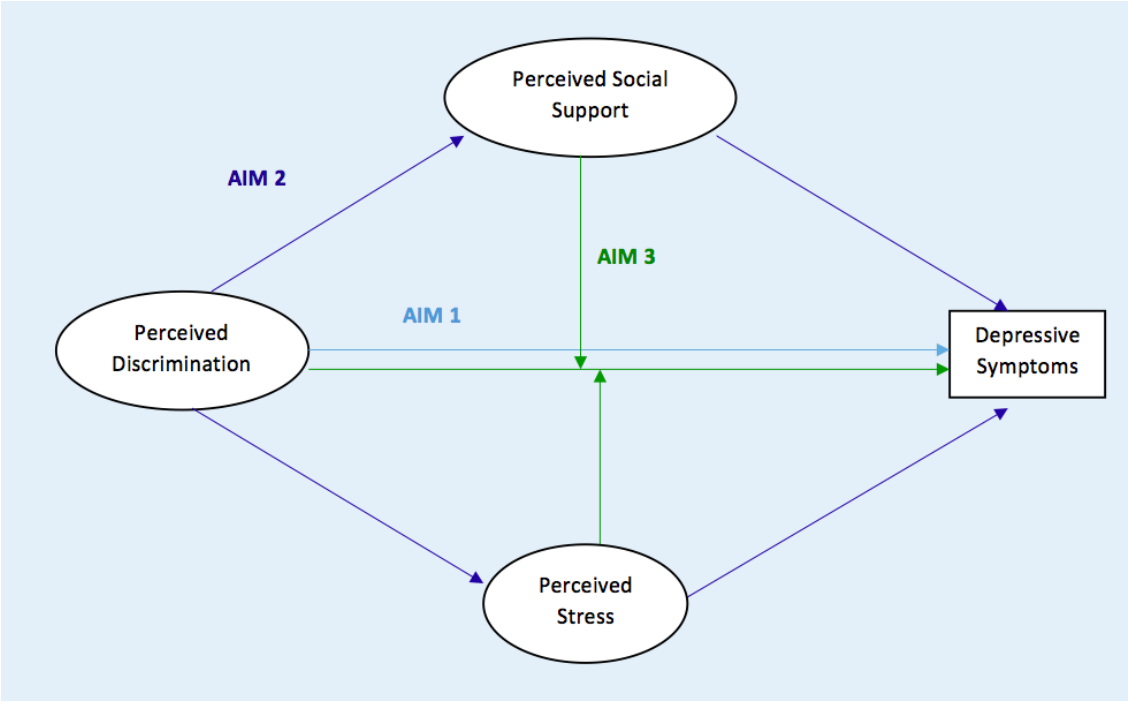

Figure 1.1. This conceptual model depicts three aims represented by three paths of colored arrows. Blue is for aim 1, purple is for aim 2, and green is for aim 3.

Dissertation Organization

This dissertation includes six chapters, three of which are manuscripts.

Chapter 1 (Introduction)

Chapter one of the dissertation describes the background of the population and research topic, rationale for the research, and study aims of the research.

Chapter 2 (Manuscript One)

Chapter two is the first manuscript of the dissertation. It is a critical review of the current state of mental health research for the Asian population in the U.S. It includes brief discussion on discrepancy of prevalence estimates, and measurement issues within the mental health field, specifically related to the Asian population. This manuscript describes challenges in researching mental health for the Asian population, and includes suggestions for improved research.

Chapter 3 (Research Methods)

The third chapter of the dissertation outlines the research methods for both manuscript two and three. The dissertation solely uses quantitative methods. This chapter describes the parent study data collection procedures and the data analyses plans for the manuscripts.

Chapter 4 (Manuscript 2)

The fourth chapter focuses on specific aim one using the parent study data. This research uses data from a foreign-born Asian sample in the Baltimore-Washington metropolitan area collected from 2012 – 2013. The first objective of this manuscript is to determine if frequencies of perceived discrimination and depressive symptoms each differ by ethnic group. The second objective of this manuscript is to determine if

perceived discrimination is associated with an outcome of depressive symptoms. Lastly, the third objective is to determine if the relationship between perceived discrimination and depressive symptoms differs by ethnic group. Bivariate and multiple logistic regression analyses is used to address these aims.

Chapter 5 (Manuscript 3)

The fifth chapter is of manuscript three, which is a quantitative analysis of the same parent study data used in manuscript two. This third manuscript addresses specific aim two and three of the dissertation. Thus, two single mediator models and one multiple mediator model were tested using Baron and Kenny's mediational analyses steps for regression. Also, moderation was tested in two models (one for perceived social support and one for perceived stress). Each of the five models are tested on the total sample and in sub-analyses by ethnic group. These aims are addressed using multiple linear regression.

Chapter 6 (Discussion)

The final chapter of this study discusses the findings of the manuscripts and includes further discussion on the implications of this research. In addition, this chapter seeks to highlight key findings, describe strengths and limitations of the dissertation, and suggest next steps for future research.

CHAPTER TWO: MANUSCRIPT ONE

The mental health of the Asian population in the United States:

A critical review of the research

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Abstract

This manuscript sought to provide a critical review of the current state of mental illness of the Asian population in the U.S, inclusive of the immigrant Asian population. In addition, it depicted the issues surrounding research on the Asian population and sought to emphasize current prevalence findings of depression in the foreign-born Chinese, Korean, and Vietnamese population. Both national data and community-based data is described, and discrepancies between the two are highlighted. An overview of mental health utilization is described and followed by a discussion of the difficulty of understanding the mental health of the Asian population. Lastly, recommendations to improve these challenges in research are outlined. Overall, this review sought to emphasize the need for additional and better research on the Asian population as a first step to prevention and improving treatment of mental illness in this population.

Introduction

The mental health of the U.S. Asian population is complex and research is vitally needed to identify those with mental illness, especially those with depression. There has been extensive literature on depression both globally and nationally, but literature specific to the Asian population is lacking. This paper provides an overview of the Asian population in the U.S., followed by a review of the current state of depression and mental health of the Asian population, including the concerns with interpreting research findings specific to this population. The focus is on three Asian ethnic groups: Chinese, Korean, and Vietnamese considering that few research studies of the Asian population are disaggregated by ethnic group. The paper concludes with challenges and recommendations for improving mental health research for the Asian population.

The Asian Population in the U.S.

The 2010 U.S. Census defines "Asian" using the standards of the U.S. Office of Management and Budget (OMB):

> "Asian" refers to a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam (U.S. Census Bureau, 2012a, p. 2).

It has been noted in the literature that the label "Asian Americans" comprises more than 30 Asian ethnicities (United Nations [UN], 2013) and more than 100 languages (DHHS, 2001). Due to the heterogeneity of Asian Americans, a description of a single Asian American population cannot be generalized to another Asian American population.

"Asian American" is typically used and identified in U.S. culture as a 'race' that describes individuals with ancestry from the Asian continent who currently reside in the U.S. (Uba, 2003). However, as many American anthropologists have argued, race is a socially constructed concept created to classify groups of individuals (American Anthropological Association [AAA], 1998). Historically related to economics, social class, and politics, race is a means to segregate individuals (AAA, 1998). Definitions of who is considered Asian American varies by institution as some consider people from Kazakhstan, Kyrgyzstan and the like as Central Asian, while other institutions do not agree with this classification (U.S. Census Bureau, 2012a). Terms used for people of Asian heritage also vary by institution and Asian American is not always the label used, but sometimes Asian Pacific Islander (API) or a similar variation is used. Asian Americans, often described as the "model minority", are plagued with the inability to be accurately measured in health research. Thus, a significant dilemma for researchers of Asian American health lies in a lack of clarity of who is considered Asian American, and if Asian American is the term and unit of analysis that should be used. For the purposes of clarity, the population of interest in this paper is defined according to the OMB standards, in the manner that the U.S. Census Bureau does as "the Asian population."

Demographics of the Asian Population in the U.S.

The Asian population (including U.S.-born and foreign-born) is currently the fasting growing racial population group in the U.S. (U.S. Census Bureau, 2012a). Asians represented approximately 5.4 percent of the U.S. population in 2014 and are expected to reach 9.3 percent of the projected U.S. population (416.8 million) by the year 2060, a 128.1% projected increase (U.S. Census Bureau, 2015). Two-thirds of the Asian

population in the U.S. are foreign-born (U.S. Census Bureau, 2011). Specifically, of the three million immigrants who arrived between 2008 and 2011, 1.2 million (40.3 percent) of them were from Asia (U.S. Census Bureau, 2011). In 2011, the total Asian foreign-born population in the U.S. represented approximately one-third of the 40 million total foreign-born Americans in the U.S. (U.S. Census Bureau, 2012b). In 2011, the percentages of the largest foreign-born Asian ethnic groups were 19.3% (China), 16.1% (India), 15.7% (Philippines), 10.9% (Vietnam), and 9.4% (Korea) (U.S. Census Bureau, 2012b). These data highlight the upsurge in the Asian population's contribution to the racial and ethnic composition of the U.S. population in recent years. Because of this expected growth, it is imperative that researchers and the public understand the current methodological and health dilemmas facing this population.

Immigration of Chinese, Koreans, and Vietnamese to the U.S.

The immigration experience, including the year of immigration, and the ethnicity of the individual may imply the reasons for migration to the U.S. and is associated with distinct experiences. The Chinese, Korean, and Vietnamese immigrants of the U.S. share similarities and differences in their history in the U.S. The Chinese were the first Asians to mass migrate to the U.S. during the 1840s, followed by the Koreans in the early 1900s, and lastly by the Vietnamese who entered after the Vietnam war (after 1975). Currently, the Chinese migrate for employment or higher education (Migration Policy Institute [MPI], 2013), while the Koreans come for economic and educational reasons, with 95 percent of Korean Americans today having migrated post-1965 (Min, 2011). Vietnamese Americans have mostly arrived post-1975 for family reunification or from war-refugee status (Valverde, 2012).

Common among all three groups is that discrimination experienced from the immigrant experience is likely to contribute to their mental health. Early Asian immigrants were commonly discriminated such that the Chinese were referred to as the "yellow peril" (Schrecker, 2010). In addition, immigration laws prevented Asians from entering the U.S. and becoming citizens beginning with The Chinese Exclusion Act (22 Stat. 58) of 1882 (U.S. Department of State, 2013). It was not until the 1965 Immigration and Nationality Act that Asians were freely allowed to migrate to the U.S. (University of Washington-Bothell, 2007). The Refugee Act of 1980 post Vietnam war defined "refugee" as someone who had left their country due to fear of persecution (MPI, 2012) and resulted in the acceptance of over half a million Vietnamese refugees and asylum seekers to the U.S. between 1981 and 2000 (American Immigration Law Foundation, 2008).

Mental Health of the Asian Population in the U.S.

Depression

Major depression is the main source of disability globally with an excess of 350 million people (20% of the world population) living with depression (WHO, 2012). It is a serious disease, often linked to poorer health outcomes such as lower productivity and quality of life, as well as increased healthcare costs (National Center for Health Statistics [NCHS], 2008). If untreated, it may escalate into suicide which is one of the top ten leading causes of death for the Asian population in the U.S., with it being particularly high among 15 – 24-year-old and elderly females (CDC, 2011; DHHS, 2012). It is known that women have a higher prevalence of depression then men worldwide (WHO,

2012). Though widespread, the majority of people afflicted with depression do not receive treatment due to social stigma, shortage of trained healthcare workforce, and lack of resources (WHO, 2012) with misdiagnosis also being a barrier. In the U.S., 8% of Americans who are 12 years of age or older currently report having depression (CDC, 2012b). Of those diagnosed with depression, 29% reported not seeking care from a professional in 2005 – 2006 (NCHS, 2008).

Measurement of Prevalence: National Data

Two primary sources of national data for prevalence of mental illness and utilization of mental health services among the Asian population in the U.S. are the National Latino and Asian American Study (NLAAS) and the National Survey on Drug Use and Health (NSDUH).

National Latino and Asian American Study (NLAAS)

In 2002 – 2003, the NLAAS was administered in each of the U.S. states and the District of Columbia, sampling 2,095 Asian adults as the first attempt to capture the prevalence of mental disorders among the Asian population at a national level (Center for Multicultural Mental Health Research [CMMHR], 2013). The NLAAS is also the first and only national mental health dataset of the Asian population in the U.S. stratified by Asian ethnicity: Chinese, Filipino, and/or Vietnamese, or 'Other Asian'. This intentional inclusion of specific Asian ethnicities has allowed for comparisons between Chinese, Filipino, Vietnamese Americans, and "Other Asians" at the national level (CMMHR, 2013).

National Survey on Drug Use and Health (NSDUH)

The second source of data on Asians in the U.S. is the NSDUH, conducted by the Substance Abuse and Mental Health Services Administration [SAMHSA] since 1971 (SAMHSA, 2013). Annually, 67,500 non-institutionalized individuals, 12 years of age and older from the 50 U.S. states and the District of Columbia are sampled. National data of the prevalence of mental disorders and utilization of mental health disorders by race is provided using the OMB 1997 standards. The NSDUH makes a distinction between Asians and Pacific Islanders, creating two separate race categories, "Asian" and "Native Hawaiian or Other Pacific Islander" (NHOPI).

Prevalence of Mental Health Disorders in the NSDUH and NLAAS

Understanding prevalence of depression is difficult because many published research using the NSDUH and NLAAS or other national data sources, may present data on and define depression in different ways. For instance, some published studies categorize depression with other mental illnesses labeling it as "any mental illness" or an "affective disorder", both which include multiple other types of mental disorders, or data sources may use different diagnosis criteria such as the Diagnostic Statistical Manual of Mental Disorders (DSM) versus use of the International Classification of Diseases (ICD) system. Thus the data presented here is a mix of available data that is inclusive of depression, and caution should be taken when interpreting the data.

According to the 2014 NSDUH, 13.1% of Asian adults in the U.S. have any mental illness (AMI); 21.2% who are 18 – 25 years old have AMI; 13.7% who are 26 – 49 years old, and 8.3% for those who are 50 years old and older. Asian adults in the U.S.

have the third highest prevalence of major depressive episode (MDE), defined as two or more weeks in the past year of being depressed compared to other ethnicities and races (SAMHSA, 2014). Past year MDE occurred among 4.2 percent of Asian adults surveyed compared to the highest prevalence among not Hispanic or Latino White adults at 7.1 percent (SAMHSA, 2014). Using NLAAS data, Jackson et al. (2011) found that MDE is lowest among the Asian population compared to their racial ethnic counterparts and that foreign-born Asians had lower prevalence of MDE than U.S.-born Asians. Thus, a difference in MDE prevalence was associated with nativity status (foreign-born or not).

Using NLAAS data, Takeuchi et al. (2007) reported prevalence of mental disorders by several demographic characteristics related to immigration. From a sample of 998 Asian men, 17.8% and 8.4% of men had any disorder (depressive, anxiety, or substance abuse) during their lifetime, and in the past 12-months, respectively. Of 1,097 Asian women, 17.4% and 9.9% had any disorder in their lifetime and in the past 12-months, respectively. Data suggest that the Asian population experience lower rates of prevalence when comparing the NLAAS results with other nationally representative studies such as the NCS (Alegría et al., 2007; Breslau, Kendler, Su, Gaxiola-Aguilar, & Kessler, 2005; Williams et al., 2007). In another study that analyzed NLAAS data, Takeuchi, Hong, Gile, and Alegria (2007) found that the Asian population had lower rates of having any affective disorder (which includes depressive disorders), indicating that 9.1% of the total sample, and 8.0% of Asian immigrants had any affective disorder in their lifetime when compared to data from the National Comorbidity Study-Replication (NCS-R); 17.9% of non-Hispanic Whites, 13.5% of Hispanics, and 10.8% of non-Hispanic Blacks had any affective disorders (Breslau et al., 2006). However, comparing

prevalence rates of any disorder between national surveys can be troublesome because research methodologies may not be identical and can lead to erroneous interpretations, though these three national studies have used the same methodology and are referred to the Collaborative Psychiatric Epidemiology Studies (CPES). Different methodologies in data collection common for depression screening include interview, computer-assisted, or self-report surveys. Additionally, the language used during data collection may also differ based on each study. In this case, the national data shows that the Asian population present with lower rates of mental disorders, inclusive of depression, however this may not be an accurate representation of what is occurring.

Nativity status, gender, ethnicity, and age

Takeuchi and colleagues (2007) also found that some differences between Asians do exist. Dichotomizing by nativity status showed that prevalence of any mental disorder is higher among U.S.-born Asians (24.6%, 13.2%) when compared to foreign-born Asians (15.2%, 8.0%) for one's lifetime and in the past 12-months, respectively. Of the foreign-born participants, those who reported immigrating at the age of 12 or younger had prevalence for lifetime any disorder similar to those who were U.S.-born, indicating that immigrating as a child may be emotionally more difficult for children. Nativity was particularly highly correlated with prevalence of disorders among women, with foreign-born Asian women being less likely to have reported lifetime depressive disorder compared to U.S.-born Asian women. Similarly, 2nd generation women experienced higher odds of having any depressive or psychiatric disorder in their lifetime and in the past 12-months when compared to first generation women. Further analyses showed that having immigrated as an adult Asian woman resulted in lower odds for lifetime

depressive disorder compared to a U.S. born Asian woman. An ethnic difference was that Vietnamese women were statistically significantly less likely to have reported lifetime depressive disorder compared to Chinese women. For men, English-language proficiency often used as a proxy measure for acculturation, was a significant predictor in having any depressive, anxiety, or psychiatric disorder among men for both lifetime and 12-month prevalence. Another study of the NLAAS data indicated that those who were to 18 – 29 years of age were 3.2 times more likely than the Asian population who were 60 years of age or older to have a DSM-IV diagnosis (J. Kim & Choi, 2010). Furthermore, significant differences between the Vietnamese group and the other Asian group appeared in the older age group, and stronger differences were detected between the Chinese group and the 'other Asian' group in the older age group. These data suggest that nativity status, gender, ethnicity, and age may significantly impact mental disorders among the Asian population.

Depressive symptoms as an outcome

Depression is typically captured using screening tools or diagnosis from a psychiatric exam. Psychiatric exams are impractical and expensive to use for studies with large populations, and thus screening tools for depression are often used in research. There are several common scales used to measure depression in both research studies and clinical settings as screening tools. Eight of the most common depression scales include the Hamilton Depression Rating Scale (HDRS), the Beck Depression Inventory (BDI), the Patient Health Questionnaire (PHQ), the Major Depression Inventory (MDI), the Center for Epidemiologic Studies Depression Scale (CES-D), Zung Self-Rating Depression Scale (SDS), Geriatric Depression Scale (GDS), and the Cornell Scale for

Depression in Dementia (CSDD) (Bienenfield, 2014). Most of these scales are self-rated scales ranging from 2 questions to 30 questions. The CES-D is one of the most widely used depression scales and has been used in many studies specific to the Asian population.

Center for Epidemiologic Studies Depression Scale (CES-D)

Many large-scale studies that aim to identify depressive symptoms as an outcome use the CES-D because it was designed for the general population. Since its inception, it has been used for the general population and specific racial and ethnic populations (Beals, Manson, Keane, & Dick, 1991; Blazer, Landerman, Hays, Simonsick, & Saunders, 1998; Eaton & Kessler, 1981; González, Haan, & Hinton, 2001; Kuo, 1984; Noh, Avison, & Kaspar, 1992; Radloff, 1977; Ying, 1988). The CES-D is a 20-item measure of depressive symptoms in the past week (Radloff, 1977). Each question is scored on a 4-point scale (0 to 3), with a maximum score of 60, with "0" being, "rarely or none of the time", and "3" being, "most or almost all of the time." Higher scores equate to more depressive symptoms. Literature denotes that the typical cut-off score for clinical depression is equivalent to a 16, meaning at 16 or greater, the individual is likely to be at risk for clinical depression (Radloff, 1977). High internal reliability was shown with a coefficient alpha of 0.85 in the original study. Radloff's original study produced a four-factor structure when performing an exploratory factor analysis (EFA). These four factors are "depressed affect", "positive affect", "somatic and retarded activity", and "interpersonal problems" (Radloff, 1977).

Psychometrics of the CES-D

Researchers have sought to validate this measure in specific racial and ethnic populations; it has been validated in the U.S. for the European population, the African-American population, the Mexican population, and the Asian population (Clark, Aneshensel, Frerichs, & Morgan, 1981; Noh et al., 1992; Roberts, 1980; Ying, 1988). Studies have indicated that the CES-D is a good measure in regards to sensitivity, specificity, and internal consistency (Lewinsohn, Seeley, Roberts, & Allen, 1997). A study of Chinese American women, using the CES-D showed sensitivity of 100% and specificity of 76% after being tested against the Composite International Diagnostic Interview (CIDI) for clinical depression (Li & Hicks, 2010).

Reliability of the CES-D has been tested for in Chinese, Korean, and Vietnamese populations and has been shown to be both reliable in many cases, but in some cases could be slightly altered to have a two or three factor structure instead of a four factor structure (Gupta & Yick, 2001; Jang, Kim, & Chiriboga, 2005; G. Kim, DeCoster, Huang, & Chiriboga, 2011; Kuo, 1984; Noh et al., 1992; Tran, Ngo, & Conway, 2003; Ying, Lee, Tsai, Yeh, & Huang, 2000; Ying, 1988). Noh and colleagues (1992) formally tested for the reliability of the CES-D in a Korean population by using a Korean translated version and found that it was very similar to the original CES-D maintaining a four-factor structure, though two of the "somatic retarded" items fit better in the "negative affect" factor.

Few studies within the literature have tested for construct validity in the Asian populations. Good construct validity of the CES-D has been reported in studies of Chinese populations in China and Hong Kong (Cheung & Bagley, 1998; Greenberger,

Chen, Tally, & Dong, 2000; N. Lin, 1989), and has been reported among a small community sample of Chinese American women (Li & Hicks, 2010). Li and Hicks (2010) found that lower self-perceived general health and lower social support was correlated with higher CES-D scores. On the contrary, participants who had stressful events (e.g. problems with work, moving to another city, immigration problems, etc.) in the past year and lifetime was correlated with higher CES-D scores in comparison to those who did not. Thus, self-perceived health, social support, and difficult events were constructs that correlated with the CES-D, depicting convergent validity. A study conducted in Korea of the CES-D Korean version also showed good construct validity in the form of concurrent validity and discriminant validity (Cho & Kim, 1998). Specifically, the concurrent validity was tested between the CES-D-K and other depressive scales such as the Beck Depression Inventory (BDI), Depression Screening Instrument (DSI), and the Hamilton Rating Scale for Depression (HRSD), and showed high correlation coefficients (0.82 BDI, 0.80 DSI, and 0.77 HRSD) in Cho and Kim's study. Additionally, discriminant validity was shown in this same study when individuals who were diagnosed with Major Depression reported the highest scores on the CES-D, while those without Major Depression reported lower scores on the CES-D. Construct validity of the CES-D in Vietnamese populations has yet to be reported in the literature.

Though reliability and validity has been tested in various ways among different Asian populations, seldom has the CES-D's psychometric properties been tested among one sample of multiple Asian ethnicities of foreign-born status. The utility of the CES-D in an Asian population is to use it as an initial screening tool for depression (Li & Hicks, 2010). Thus, future research should be conducted testing the psychometrics of the CES-D

among one sample of Chinese, Vietnamese, and Korean foreign-born population in order to identify if ethnicity is significantly different.

Prevalence using the CES-D over the years

Few community-based studies have investigated differences between the prevalence of depression between Asian ethnicities. For those community-based studies that have investigated prevalence among specific Asian ethnicities, the CES-D is often used as the outcome measure (Bernstein, Park, Shin, Cho, & Park, 2011; Gellis, 2003; G. Kim et al., 2011; H. J. Kim et al., 2015; Kuo, 1984; Y. M. Lee & Holm, 2012; Mui & Lee, 2013; Rice, Choi, Zhang, Morero, & Anderson, 2012; Shen & Takeuchi, 2001; Tran et al., 2007). Kuo's seminal 1984 study of depression among Chinese, Korean, Japanese, and Filipino's living in the Pacific Northwest, conflicts with the notion that Asians have lower prevalence estimates of depression when compared to their racial and ethnic counterparts. Kuo, using the CES-D, reported that the Asian population as a whole score slightly higher on the CES-D compared to their white counterparts and that Korean Americans score higher than the other three ethnic groups (Kuo, 1984). Kuo and Tsai (1986) reported that new immigrants had double the rate of depression compared to the Chinese, Japanese, and Filipino subpopulations and that immigrants with social support had less depressive symptoms than those without social support.

Hurh and Kim (1988) reported similar results in a Chicago community, indicating that Korean immigrants were more depressed when compared to the other three Asian ethnic groups in Kuo's study. In another study, Ying (1988) reported that Chinese Americans from San Francisco were more depressed than the Chinese from Kuo's study. Years later, Cho, Nam, and Suh (1998) reported that Korean adults had a high prevalence

of depression using the CES-D; 23.1 % of males, and 27.4% of females had a cut-off of 16 or higher. In a study of Vietnamese adults, Tran et al. (2007) showed that the average CES-D score was 12.28 (SD of 7.8) and that 30% of the sample classified as depressed in a community sample of Vietnamese adults. Additionally, the study indicated that after 12.5 years of living in the U.S. depression levels decrease.

More recently a meta-analysis of the Asian population (H. J. Kim et al., 2015) showed that there are differences in the amount of studies available on specific Asian ethnic populations and that the depression tools used for each study vary. This systematic review showed that the most common self-report depression scale used for the Asian population was the CES-D. Of the Chinese, Vietnamese, and Korean populations, Koreans had the most studies overall. Kim and colleagues' (2015) meta-analysis revealed that from the several studies in the past 10 years that used the CES-D on a Korean population, the prevalence of depression ranged from 13.2% to 71.0% among adults, parents, and caregiver groups (Bernstein et al., 2011; Jang & Chiriboga, 2011; Jang, Chiriboga, Kim, & Cho, 2009; Jang et al., 2005; E. Kim, 2009, 2011, 2012; E. Kim, Seo, & Cain, 2010; E. E. Lee & Farran, 2004; Park & Rubin, 2012). In a 2011 study of a New York City Korean American population, 13.2% of Korean Americans sampled exhibited depressive symptoms with an average score of 11.59 (SD 9.7) when using a cutoff of 21 or higher, with greater discrimination being predictive of depressive symptoms as well as lower English proficiency (Bernstein et al., 2011). Y. M. Lee and Holm (2012) found that 22.6% of elderly Korean Americans (>60 years old) sampled had clinical depression using the CES-D. While another study indicated that 71% of Korean caregivers were

depressed using the CES-D (E. E. Lee & Farran, 2004). Thus a wide range of prevalence estimates has been reported in community-based samples for the Korean population.

Though dated, Kuo's 1984 study provides the basis of a trend that is periodically seen in community-based studies and has been documented in recent studies; the Asian population's prevalence of depression may indeed be equal or greater to their racial counterparts and that depression is a relevant issue for this population (Bernstein et al., 2011; Cho et al., 1998; Hurh & K. C. Kim, 1988; Jang & Chiriboga, 2011; Jang et al., 2009; Jang et al., 2005; E. Kim, 2009, 2011, 2012; E. Kim et al., 2010; Kuo, 1984; E. E. Lee & Farran, 2004; Ying, 1988). The estimated pooled prevalence of depression using the CES-D was 35.6% (95% CI 27.6, 43.7%) for the Asian population, which denotes more than a third of the population (H. J. Kim et al., 2015). Specifically, this systematic review showed that Koreans pooled prevalence was 33.3% (95% CI 27.5%, 39.1%) while Chinese pooled prevalence was 15.7% (95% CI 6.5%, 24.9%) when using the CES-D. Thus, rates of prevalence seen in national datasets may not be indicative of what occurs at the community level. Similarly, differences by ethnic group may exist. As Sue and colleagues (2012) have stated, "stereotyping Asian Americans as a model minority group is harmful because an underestimation of their rates of mental disorders may result in reduction of needs-based societal attention, goods, and services" (p. 536). The model minority moniker, though intended for good, has become a misnomer, especially in the field of mental health.

The complexity of being Asian—what does it mean in understanding data?

Mental health utilization

Knowing that shame and stigma often inhibits help-seeking among various populations, underreporting of mental health illness is a significant potential for many Asian ethnicities (Black, Curran, & Dyer, 2013; Ting & Hwang, 2009). For example, literature illustrates that Asian ethnicities such as Chinese-Americans stigmatize individuals and families with mental illness, and also associate mental illness with shame (Kleinman & Kleinman, 1993; Yang et al., 2008). Over the years, research has indicated that Asians consistently have low rates for seeking mental health services (e.g. counseling, seeing a mental health professional privately or publicly) in the U.S. (SAMHSA, 2014; Sue et al., 2012). The 2014 NSDUH states that 33.0% of the Asian population with AMI sought treatment or counseling, while 13.1% percent of the Asian population was suspected to have AMI (SAMSHA, 2014). This was similar to the help-seeking estimates for Hispanics and Not Hispanic Black or African American: 32.4% and 32.8%, respectively. Additionally, a study using the NLAAS data indicates that U.S.-born Asians were more likely than foreign-born Asians to use mental health services (Ta, Holck, & Gee, 2010). Furthermore, Asians who were not as cohesive with their family were also less likely to use mental health services. Thus, foreign-born Asians with high family cohesion were less likely to use mental health services than U.S. born Asians with high family cohesion. This suggests that family unity may be an important influence in not choosing to seek care, potentially due to stigma, for Chinese, Vietnamese, and Filipino Americans, and that generational status impacts help-seeking behavior among this population.

Asians who seek mental health care consistently present with more severe forms of mental illness when compared to their racial/ethnic counterparts, and because of this, utilization of services is not a good indicator of need (Durvasula & Sue, 1996; Kearney, Draper, & Barón, 2005; Narikiyo & Kameoka, 1992; A. Y. Zhang, Snowden, & Sue, 1998). In mental health, literature indicates that a treatment gap exists among all ethnicities; a low percentage of the population in need receive mental health care (Mojtabai, Eaton, & Maulik, 2012). Social scientists have theorized that the disparity in utilization rates among the Asian population compared to other racial and ethnic populations do not represent a lower need for mental health care, but rather a delay in help-seeking (Durvasula & Sue, 1996) or a lack of seeking specialty mental health services (mental health professionals: psychiatrists, psychologists, counselors, social workers, etc.) and a preference for other forms of help such as online support groups, Traditional Chinese Medicine (TCM), primary care physician (PCP), help from oneself, or help from family and friends (Chu, Hsieh, & Tokars, 2011; Yang, Corsini-Munt, Link, & Phelan, 2009). Low mental health service use rates in the Asian population could be due to underreporting related to cultural beliefs (Sue et al., 2012). TCM and similar methods of Eastern treatment are preferred by many East Asian populations when compared to use of Western Medicine (K.-M. Lin, Inui, Kleinman, & Womack, 1982; Yang et al., 2008). Though there has been research supporting alternate forms of mental health treatment like TCM (Yang et al., 2008), most research on utilization of mental health services usually focuses on treatment defined as seeing a mental health specialist or PCP (Pescosolido & Boyer, 1999).

Interventions to improve utilization rates among the Asian population often are targeted at the language barrier and seek to increase the number of Asian mental health providers who speak the language (Sue et al., 2012). An interesting phenomenon identified in Abe-Kim et al.'s (2007) study, suggested that the Asian population who was first generation (foreign-born population) with a probable disorder diagnosis had a higher percentage (30.4%) than the second-generation population (28.8%) to seek any type of care, but that the third generation or later population had the highest percentage (62.6%) of help-seeking for mental health, hinting at differences in the acculturation experience between generations. This study, as others, has suggested that the second generation Asian population may have a more difficult time psychologically adjusting to two cultures (S. Lee et al., 2009). Thus, research has shown that nativity once more can be indicative of differences between Asians.

Along with historical and cultural factors that may influence both diagnoses of mental illness and utilization of mental health services, attributes of measurement of Asians such as definitions of race, illness and service use, instruments used, and languages employed are components of measurement that need to be standardized.

Discussion

National data commonly is heralded as the status quo for defining the state of disease but is not always representative of a community. As a result, community-based studies have value that is often overlooked. Thus, more community-based research exploring the mental health of the Asian population is needed. Differences between Asian ethnic groups may influence mental health. Culture-bound syndromes may exist. For example, in Korean culture, some scholars have described a syndrome named Hwa-

byung (Suh, 2013), a fire illness, similar to depressive disorder in the Western cultures. Additionally, nativity status may affect mental health. As previously described, unique migration patterns exist between Asian ethnic groups and within ethnic groups. Refugees may have higher rates of PTSD, compared to voluntary migrants (Rasmussen et al., 2012; DHHS, 2012). Ethnicity and migration are both valuable factors to consider in future research for this field. Likewise, several social factors associated with the migration experience such as perceived discrimination, perceived stress, and perceived social support may be influencing the mental health of the Asian population and should be further explored.

Fitting in academia: Is there room for mental health in public health?

The Asian's population's mental health is an understudied and low prioritized issue among institutions and academia. Among several reasons for this, is the possibility that research about the Asian population's mental health— where it currently lies—has been saturated. Social scientists that have led the research in this field, and continue to do so, are the few that lead the way with hopes that more interest and uptake in researching the mental health of this population will occur. As Sue et al. note in their Call to Action (2012), progress in research regarding the mental health of the Asian population has certainly occurred, especially with the plethora of studies that have been conducted on the NLAAS in the last decade. However, the authors state, ". . . greater efforts are needed to provide outreach at the community level and to bridge the gap between mental health and other medical or alternative health facilities" (p. 532). Though this is a salient and deserving recommendation which needs to be addressed, the current literature fails to address possibly a more pressing and preceding gap in

research—the divide between the disciplines in academia that currently study the Asian population's mental health, and the field of public health.

It is vital that public health as a discipline, begins to naturally include mental health as an essential element to the public health discipline. With that, studies in mental health of the Asian population can be introduced and given the publicity it needs to compel social scientists to take part in this worthwhile research. By inviting students to take part in this discourse, the drive for future researchers to carry on this work can be achieved and possibly sustained. Considering that understanding the mental health of the Asian population epitomizes obstacles researchers encounter in research, from methodological hurdles to challenges in delivery of care, it is an exemplar candidate for fitting into public health academic curriculum. But as is, it fails to garner attention among most schools and researchers and because of such, it should be advocated for its addition.

Challenges and Recommendations

Prevalence data for the Asian population in the U.S. is inconsistent and rarely found at the ethnicity level. Differences between ethnic groups are largely unstudied, and as noted, migration to the U.S. may have historical implications, which may affect one's mental health. Thus, appreciating the research to date on nativity status is also warranted. Asians are commonly presented as having lower prevalence of mental disorders compared to their ethnic counterparts. However, because mental health illnesses may have different meanings in different cultures, there can be misdiagnoses and inaccurate reporting of prevalence among the Asian population (Sue et al., 2012). Additionally, it is difficult for researchers to accurately pinpoint the prevalence of mental health illnesses

because these illnesses have a history of being linked to stigmatizing an individual (DHHS, 2001), which often leads to underreporting. Also, the Asian population is known to manifest their mental illness symptoms by somatization (Sue et al., 2012), which can add to misdiagnosis. Similarly, the heterogeneity of the Asian population compounds this issue. Prior to the NLAAS in 2002, there were no known nationally representative epidemiological surveys in the U.S. that targeted the mental disorders of the Asian population in the U.S. (Takeuchi et al., 2007). This was partially because the Asian population represents such a small percentage of the U.S. population and because of the misconception that it was not needed due to low mental health service use rates (Takeuchi et al., 2007). However, community-based studies have indicated that Asians may have as great if not greater rates of depression compared to their racial and ethnic counterparts.

Literature suggests that few studies are being conducted on the topic of mental health in Asians when the need is both apparent and critical (Sue et al., 2012). One major issue with data regarding the Asian population is the inconsistency in the use of labels and categorizations for the Asian population among researchers and government institutions. Sometimes Asians are combined with Pacific Islanders and other times they are not (Leong & Lau, 2001). They are also at times referred to as Asians, Asian Americans or APIs. The most insightful and accurate data would theoretically divide the category of "Asian" into several separate subcategories by Asian ethnicity; efforts towards this effort are underway by the DHHS with the enactment of Section 4302 of the Affordable Care Act on October, 2011 (DHHS, 2011). This law requires that data collection on ethnicity and race be updated for all national population health surveys by

creating subcategories of "Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, and Other Asian" for those who identify as Asian. For Pacific Islanders the new subcategories must include "Native Hawaiian, Guamanian or Chamorro, Samoan, or Other Pacific Islander" (DHHS, 2011). The following are future recommendations to improve both research and interventions for the Asian population's mental health:

1. Better integration and promotion of the Asian population's mental health among researchers outside of public health academia and researchers at public health institutions by forming professional networks and interdisciplinary collaboration.
2. Encourage a greater understanding of current issues in the Asian population's mental health by referencing Sue et al.'s 2012 Call to Action to the greater public health community.
3. Address discrepancies between definitions and groupings of the Asian population by following the DHHS guidelines in academic research when appropriate.
4. Promote research in measurement standardization and psychometrics of the CES-D or other mental health measures for the Asian population.
5. Promote targeted research on the Asian population by ethnicity when sample size is large enough to do so.
6. Promote targeted research on the Asian population by nativity status by specifically investigating the influence of migration on mental health.
7. Increase the Asian population's mental health workforce, with special emphasis on bilingual Asians.
8. Conduct further research on interventions that address shame and stigma, for instance mindfulness practices may be a possible direction of research for this

population as it aligns with some Asian ethnic group's beliefs and values (Hall, Hong, Zane, & Meyer, 2011).

There has been progress toward understanding mental health in the Asian population in the U.S., however there is a great deal more that needs to be done to improve timely diagnosis and treatment. Often deemed as the model minority, this population is the fastest growing minority group in the U.S. Thus, it is paramount that researchers, policy makers, public health professionals and health care providers highlight the importance of mental health in the Asian population and garner the necessary expertise and resources to address the growing emotional disorders borne out of sociocultural factors likely associated with discrimination, trauma and immigration.

CHAPTER THREE: RESEARCH METHODS

Overview of study design

The dissertation uses data from a cross-sectional parent study on a foreign-born Asian population in the Baltimore-Washington metropolitan area. This chapter outlines the sample population, the data source, and the data collection procedure of the parent study. Lastly, this chapter provides details of the variables used for each analysis in manuscript two and three, as well as details of the exploratory factor analysis of the five measures used in manuscript two and three.

Population

A total of 600 foreign-born Asian adults, 18 years of age and older, were recruited from the community using a non-probability sampling strategy. This randomized controlled trial (RCT) study was designed to test the effectiveness of a lay health workers (LHWs) intervention on adherence to hepatitis B virus (HBV) vaccinations among those who are unprotected.

Eligibility criteria

- Foreign-born Chinese, Korean, and Vietnamese Americans 18 years of age and older who reside in the target area
- Those who are not aware of their hepatitis B infection status
- Will stay in the targeted area for the next 2 years
- Willing to give written consent to participate in the study

Data source and data collection

Recruitment procedures

Convenience sampling was used to recruit participants in Maryland and Northern Virginia. Recruitment locations were identified through local community-based organizations (CBOs) (such as the Hepatitis B Initiative of Washington, DC (HBI-DC)), the Asian American Healthcare Center (AAHC), and other links made through the community advisory board, which was established in 2008. Most recruitment events targeted only one of the three ethnic groups: foreign-born Chinese, Korean, or Vietnamese Americans. However, two of the recruitment locations (AAHC and one of the health fairs) were used to recruit both Chinese and Korean participants. First, print advertisements in local Chinese, Korean, and Vietnamese newspapers and local Asian grocery stores describing the study location and time were placed. Individuals who expressed interest in participating were screened for eligibility and invited to the study. Second, LHWs, who completed a 7-hour all-day training on hepatitis B that was conducted by the research team, announced upcoming screening events in their communities. Most participants were recruited by word of mouth through the LHWs. The research team and LHWs attended these events to recruit potential participants. Third, church and temple leaders were contacted to arrange recruitment events at their organization. For some events, participants were recruited on the spot, and for others pre-screened participants were "signed up" ahead of time. Also, throughout the recruitment period, specific Saturdays were assigned for research team members and LHWs to visit the AAHC clinic in Maryland to recruit potential participants.

Chinese recruitment

The Chinese population was recruited from the AAHC, two health fairs, two language schools, two Universities, a Buddhist non-profit organization, and a Christian church. Chinese recruitment was more evenly dispersed by venue as compared to the Korean and Vietnamese populations. AAHC provided approximately 30 percent of the Chinese population, Universities and health fairs provided roughly 22 percent each, the language schools and Buddhist non-profit provided approximately 10 percent each, and the remainder of the Chinese population came from a Christian church.

Korean recruitment

The Korean population was recruited primarily from the AAHC and Christian churches. A health fair and a job fair at a local high school were also used for recruitment. The majority of Korean participants were recruited from five Christian churches, while a fourth of the participants were recruited from AAHC.

Vietnamese recruitment

The Vietnamese population was recruited mainly from two Catholic churches (one in Maryland and one in Northern Virginia) and a popular Vietnamese shopping center in Virginia. They were also recruited from a Buddhist monastery and only one participant was recruited from AAHC.

Data collection procedures

Pre-test/Education program

After obtaining the informed consent for pre-test, screening test, and blood banking, all the participants were asked to complete a self-administered questionnaire in English, Chinese, Korean, or Vietnamese, with the assistance of a bilingual interviewer when necessary. Research team members measured height, weight, waist and hip circumferences, and blood pressure for each participant and recorded them on two index cards, in which case, one was kept by the staff and one was given to the participant. The data collection period was from April 2013 to March 2014.

Quantitative data

This dissertation only uses data from the self-administered questionnaire (pre-test).

Quantitative methods: Manuscript 2

Variables of interest

Sociodemographic characteristics

The covariates used in the analysis for manuscript two included age, ethnicity, gender, family income, and English proficiency. The age variable was categorized into three groups, 18 – 39 years old, 40 – 59 years old, and 60 years and older. The reference group was 18 – 39 years old, and was coded as one, while 40 – 59 years old was coded as two, and 60 years and older was coded as three. The ethnicity variable was coded as one

for Chinese participants, two for Korean participants, and three for Vietnamese participants, with Chinese being the reference group. Gender was coded as males as one, and females as two, with males being the reference category. Family income was coded into four groups, with one being those whose family income is less than $20,000 (reference group), two being those whose family income is $20,000 to less than $50,000, three being those whose family income is $50,000 to less than $90,000, and four being those whose family income is $90,000 or more. English proficiency was categorized into three groups, with one being the reference group of those who speak "fluent or well", while those who spoke English "so so" were coded as two, and those who spoke English "poor or not at all" were coded as three.

Perceived Discrimination

Perceived discrimination was defined using two variables, one that was labeled "discrimination" and one that was labeled "unfair treatment". For the "discrimination" variable, seven items from a perceived discrimination scale were summed to create a total score of 0 – 35, and then categorized into the three groups. The reference group was coded as one and included those whose total score was zero, while the "mild discrimination" group included those whose total score was 1 – 7 and was coded as two. The "high discrimination" group was coded as three, and included those who scored an eight or higher for their total score. For the "unfair treatment" variable, four items on a scale were summed to create a total score, ranging from 0 – 12. The variable was dichotomized, with those who scored a zero being categorized as one for the reference group, while those who scored a one or more were coded as two and represented "any unfair treatment".

CES-D

The 20 items of the CES-D were summed, with the four positively framed items being reversed scored (item 4, 8, 12, 16). The total score was then dichotomized into two groups, with the reference group being coded as zero and which included those who scored a 0 – 15 on the CES-D. Those who scored a 16 or higher were coded as one and represented the "depressed" group.

Quantitative methods: Manuscript 3

Variables of interest

Sociodemographic characteristics

The covariates used in the analyses for manuscript three were the same as those used for manuscript two. There were no changes to the coding of these variables.

Perceived Discrimination

In manuscript three, perceived discrimination was defined by only the 7-item scaled variable. This variable was summed to create a total score of 0 – 35. This variable was kept continuous for the mediation analyses. For the moderation analyses, perceived discrimination was categorized into three groups as it was in manuscript two with no discrimination being coded as one, a score of 1 – 7 being coded as two for "mild discrimination" and a score of eight or more being coded as three for "high discrimination".

Perceived Social Support

Perceived social support was defined using an 8-item scale. These eight items were summed to produce a total score which ranged from 0 – 40, and then was divided by eight to produce a score of 1 – 5. This item was kept as a continuous variable, but was centered at the mean.

Perceived Stress

Perceived stress was defined using a 10-item scale. These ten items were summed to produce a total score which ranged from 0 – 41, though 50 was the maximum possible total score. This variable was kept as a continuous summed score, but was centered at the mean.

CES-D

The 20 items of the CES-D were summed, with the four positively framed questions (items 4, 8, 12, 16) being reverse scored. The possible scores for the total score was 0 – 60. This item was kept continuous.

Exploratory Factor Analysis (EFA)

Exploratory factor analysis was conducted for the five measures prior to analyses in manuscript two and three. The EFA for all five measures used principal component factors and promax rotation, with screeplots and parallel analysis performed. The first measure was the outcome measure, the CES-D, which was based on a 20-item scale. Each item was scored on a Likert scale of 0 – 3, with zero being "rarely or none of the time", two being "some or a little of the time", three being "occasionally or a moderate

amount of time", and three being "most or almost all of the time". The total possible range was 0 – 60 for this scale. The 20 items produced a three factor structure. There were three Eigenvalues greater than one (6.75, 2.56, 1.22) suggesting three factors. The screeplot suggested three factors, but parallel analysis suggested two factors. Factor loadings ranged from 0.46 – 0.77 for factor one, 0.43 – 0.84 for factor two, and 0.64 – 0.81 for factor three. The Cronbach's alpha was 0.83, with a mean score of 11.66 (SD 8.13) for the CES-D.

The "discrimination" measure was composed of seven items and was scored on a 0 – 5 scale, with zero being "never", one being "less than once a year", two being "a few times a year", three being "a few times a month", four being "at least once a week" and five being "almost every day". The total possible range was 0 – 35 for this scale. The seven items generated a one factor structure. The Eigenvalue greater than once was 5.10, and the factor loadings ranged from 0.82 – 0.89. The Cronbach's alpha was 0.94, and the mean score for the "discrimination" variable was 3.93 (SD 5.16).

The "unfair treatment" measure was comprised of four items. The answers were scored from 0 – 3, with zero being "never", one being "once", two being "twice" and three being "three times or more". The possible range of scores was 0 – 12. The Eigenvalue greater than one was 2.04, and the items loaded onto one factor. The factor loadings ranged from 0.60 – 0.78, with a Cronbach's alpha of 0.62. The mean score for this variable was 0.52 (SD 1.31).

The perceived stress measure was composed of ten items, which were summed to produce a total score. Those who answered "never" were coded as one, while two was "almost never", three was "sometimes", four was "fairly often", and five was "very

often". The possible range of scores was 10 – 50. The EFA produced a two factor structure, with Eigenvalue of 3.98 and 2.46. The Cronbach's alpha was 0.72, with factor one loadings ranging from 0.74 – 0.86, and factor two loadings ranging from 0.52 – 0.85. The mean score was 25.54 for perceived stress (SD 5.85).

The perceived social support measure is composed of eight items, which are summed to produce a total score, with possible score of 8 – 40. Those who answered "much less than I would like" were scored as one, while those who answered "less than I would like" were scored as two, "some, but would like more" was three, "almost as much as I would like" was four, and "as much as I would like" was five. The EFA generated a one factor structure, with factor loadings ranging from 0.77 – 0.90, and a Cronbach's alpha of 0.94. The mean score was 29.07 (SD 8.05) for perceived social support.

CHAPTER FOUR: MANUSCRIPT TWO

Perceived discrimination's influence on depressive symptoms among foreign-born Chinese, Korean, and Vietnamese American adults

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Abstract

Objective:

The objective of this study is to determine if perceived discrimination is associated with depressive symptoms in the Asian population in the U.S. A secondary objective is to determine if frequencies of perceived discrimination and depressive symptoms differ by Asian ethnic group.

Methods:

The study participants were 600 foreign-born Chinese, Korean, and Vietnamese adults residing in the Baltimore-Washington metropolitan area. Perceived discrimination was defined by two constructs labeled "discrimination" (n=7, alpha=0.94) and "unfair treatment" (n=4, alpha=0.62). The Centers for Epidemiologic Studies- Depression Scale (CES-D) was used as a binary outcome. Age, gender, ethnicity, and other sociodemographic characteristics were included as covariates (control variables). Multiple logistic regressions were performed to test the association between perceived discrimination and depressive symptoms.

Results:

Twenty-six percent of the total sample reported being depressed (21% percent of Chinese, 34% of Koreans, and 24% of Vietnamese). Participants in the "high discrimination" group had 6.35 times greater odds of being depressed compared to those who had never experienced "discrimination" (95% CI=3.42, 11.77), while those in the "mild discrimination" group had 2.45 times greater odds of being depressed compared to

those who had never experienced “discrimination” (95% CI=1.48, 4.06), while adjusting for all covariates. Those who had “any unfair treatment” had 2.76 times greater odds of being depressed compared to those who had “none”, while adjusting for all covariates (95% CI=1.73, 4.39). When stratified by ethnic group, the association held for all three ethnic groups for those with “high discrimination”, and held for those with “mild discrimination” for Chinese and Vietnamese. The association for “unfair treatment” held for Koreans and Vietnamese, but not Chinese.

Conclusions:

This research is consistent with the overall literature among the general population stating that increased perceived discrimination is associated with poorer health outcomes, and in this case, worse depressive symptomology. The ethnic group differences suggest that future studies of the Asian population should stratify by ethnic group to examine ethnic level differences. Findings from this study adds to the small, yet growing literature on the mental health of Asians living in the U.S.

Introduction

Discrimination in the U.S. has a long history that extends to people of minority status, whether it is due to an individual's race/ethnicity (Bayer, McMillan, & National Bureau of Economic Research., 2005), gender (Blau, Gielen, & Zimmermann, 2012; Chin, 2004; Nicolas, 2013), age (Sargeant, 2011), sexual orientation (Blau et al., 2012; Chin, 2004; Duffy, Visconti, Kemnitz, & National LGBT Bar Association, 2014; Nicolas, 2013), socioeconomic status or any other social construction assigned to an individual by society (Healey, 2012; Orelus, 2011; Sargeant, 2011; Tamura, 2008). Discrimination has been linked to multiple health outcomes, with higher discrimination resulting in poorer health (Clement et al., 2015; Foynes, Smith, & Shipherd, 2015; Hoggard, Hill, Gray, & Sellers, 2015; Kessler et al., 1999; Quinn, Williams, & Weisz, 2015; Williams, Neighbors, & Jackson, 2003; Williams & Williams-Morris, 2000; Williams, Yan, Jackson, & Anderson, 1997).

Growing interest in discrimination against the African American population and its influence on health has led to significant research on both its causes and impacts (Banks, Kohn-Wood, & Spencer, 2006; Bell, Zimmerman, Almgren, Mayer, & Huebner, 2006; Borrell, Kiefe, Williams, Diez-Roux, & Gordon-Larsen, 2006; Chae, Lincoln, Adler, & Syme, 2010; Collins, David, Handler, Wall, & Andes, 2004; Cozier et al., 2006; Mays, Cochran, & Barnes, 2007; Ryan, Gee, & Laflamme, 2006; Taylor et al., 2007; Williams & Williams-Morris, 2000). Several studies have shown a link of perceived discrimination with mental health outcomes among the African American population. For instance, a study by Banks et al. (2006), revealed that when using the perceived everyday discrimination scale among 570 African American respondents, discrimination

was associated to depression. Another study by Ryan et al. (2006) found that poorer mental health was associated with self-reported discrimination for those with African descendants, as well as in Mexican Americans, and other Latinos, with African descendants having the strongest relationship. Williams and Williams-Morris (2000) theorized that racial discrimination may affect mental health in three ways: institutional racism's effect on socioeconomic status, physiological and psychological reactions to discrimination, and self-evaluating based on negative racial stereotyping. Thus, perceived discrimination's negative effect on mental health has been explored in the African American population.

In addition to poorer mental health, discrimination has also been linked to negative physical health among African Americans. A study by Borrell et al. (2006) indicated that racial discrimination among African American men and women was associated with both poor physical and mental health. Another study examined racial discrimination and the role of internalization of negative beliefs about African Americans and found both as a risk to cardiovascular health (Chae et al., 2010). Other poor health outcomes have been found to be associated with racial discrimination such as very low birthweight for African American women exposed to interpersonal racial discrimination (Collins et al., 2004). Similarly, Taylor et al. (2007) showed that perceived discrimination is associated with breast cancer incidence in African American women. Thus, research on discrimination of African Americans and the effect of discrimination on health is widespread. From this large body of research, we have learned a great deal about perceived discrimination, race, health and mental health; yet, when it comes to

other racial and ethnic minorities the picture isn't quite as clear largely because of the absence of research efforts on other ethnic minorities, including that of Asians in the U.S.

Discrimination among the Asian population in the U.S. existed by law since the late 1800s shortly after Chinese immigrants first arrived to work on the transcontinental railroad (Lingen, 2003; Schrecker, 2010). Soon after the arrival of the first Chinese immigrants to the U.S., the Chinese Exclusion Act was passed and prevented Chinese immigrants from entering the U.S. and receiving citizenship (Finkelman & Lesh, 2008; Railton, 2013; Soennichsen, 2011). In later years this exclusion extended to any Asian immigrant and resulted in years of Asian exclusion until the repeal of the Chinese Exclusion Act in 1943. Other laws also existed that led the Asian population to feel like second-class citizens (E. Lee, 2015). A few current studies have explored the discrimination among the Asian population in the U.S. and shown that the Asian homebuyers were discriminated against 21.5% of the time (Turner, Ross, Bednarz, Herbig, & Lee, 2003). Another showed that a quarter of Americans believed that Chinese Americans were "taking away too many jobs from Americans", and one reported that Chinese Americans, "don't care what happens to anyone but their own kind" (Committee of 100, 2001).

The Asian population in the U.S. is often labeled the "model minority" and as such are often overlooked when it comes to research on health (Sue et al., 2012) because of this misconception (Doherty, 2013). The model minority generalizes the Asian population in the U.S. to be hardworking and successful, and as a result an assumption is that they have better health when compared to other ethnic groups (Chao, Chiu, Chan, Mendoza-Denton, & Kwok, 2013; Chen & Hawks, 1995; S. Lee et al., 2009; S. J. Lee &

Rotheram-Borus, 2009; Somani, 1994; S. Sue, Sue, Sue, & Takeuchi, 1995; Tendulkar et al., 2012). This is particularly troublesome when attempting to understand the mental health of this population.

The National Latino and Asian American Study (NLAAS) collects data on a national representative sample of the Asian population in the U.S. Data from the NLAAS indicated that 9.1% of the total Asian sample had any affective disorder in their lifetime, which includes depressive disorders, while of the foreign-born Asians, 8.0% had any affective disorder compared to 17.9% non-Hispanic Whites, 13.5% Hispanics, and 10.8% non-Hispanic Blacks (Breslau et al., 2006). Nearly 25% of U.S. born Asians had any mental disorder in their lifetime, compared to 15.2% of foreign-born Asians (Takeuchi, Zane, et al., 2007), 29% in Hispanics (Alegría et al., 2007) and 30.5% in Blacks (Williams et al., 2007) having any mental disorder in their lifetime. These data suggest that the Asian population in the U.S. have lower rates of mental disorders compared to other racial and ethnic groups. Though the research on the Asian population's mental health has progressed, the data available is still limited.

Community-based studies using the CES-D have shown that high levels of depressive symptoms exist in the Asian population (Hurh & Kim, 1988; Jang, Kim, & Chiriboga, 2005; E. Kim, 2011, 2012; H. J. Kim et al., 2015; Kuo & Tsai, 1986; Li & Hicks, 2010; Ying, 1988). For instance, a recent meta-analysis by H. J. Kim et al. (2015) used multiple measures of depressive symptoms but the most commonly used tool was the CES-D. They found that for those studies using the CES-D, Koreans pooled prevalence of depression was 33.3% (95% CI: 27.5%, 39.1%), while for Chinese the pooled prevalence of depression was 15.7% (95% CI: 6.5%, 24.9%). Additionally, a

statistical significant difference between Koreans and Chinese prevalence was determined, p=0.012. Thus, understanding the current levels of depressive symptoms among a community-based Asian sample is important because high levels have been reported and differences by ethnicities have as well.

Few studies specific to the Asian population, which investigate this relationship between perceived discrimination and mental health, have been conducted in the past 15 years (Bhui et al., 2005; Karlsen & Nazroo, 2002; Noh, Beiser, Kaspar, Hou, & Rummens, 1999; Noh & Kaspar, 2003; Pernice & Brook, 1996). For instance, a study of Korean immigrant adults living in Toronto, Canada showed that perceived discrimination was associated with depressive symptoms (Noh & Kaspar, 2003). While in the U.S. studies have also shown that perceived discrimination is linked with depressive symptoms (Bernstein et al., 2011; Mossakowski, 2003), and poor mental health (Gee, 2002). A study by Bernstein and colleagues (2011) showed that Korean immigrants residing in New York City who reported higher self-reported exposure to discrimination also had higher depressive symptoms and similarly those with low English proficiency were linked to higher depressive symptoms. Another study that used data from the NLAAS found that self-reported racial discrimination among Asian adults was associated with greater odds of having mental illness, including depressive disorders or anxiety disorders in the past year (Gee et al., 2007). Likewise, another study that used data from the NLAAS determined that higher perceived discrimination was associated with poorer mental health and that this relationship held regardless of gender (Hahm, Ozonoff, Gaumond, & Sue, 2010). Moreover, Hahm and colleagues (2010) study also revealed that women's perceived discrimination was associated with poor mental health at a lower

threshold of perceived discrimination than when compared to men. Additionally, perceived discrimination has been linked to lower use of mental health services among Chinese Americans in Los Angeles (Spencer & Chen, 2004).

Overall, there have been few studies that have looked at the link between perceived discrimination and depressive symptoms among the Asian population in the U.S. at a community-based level, especially by ethnic group. The immigration history to the U.S. of each Asian ethnic population is different and could have implications on their health. For instance, the historical discrimination that coincided with the migration of particular ethnic populations could impact the contemporary and everyday discrimination that occurs in the Asian population in the U.S. today.

This study seeks to examine if perceived discrimination is associated with depressive symptoms in the Asian population in the U.S. using a community-based sample. Secondly, it attempts to identify if the amount of people who experience perceived discrimination differs by ethnic group, and if the amount of people who are depressed differs by ethnic group. Lastly, this study seeks to identify if the hypothesized association between perceived discrimination and depressive symptoms differs by ethnic group.

Methods

The data used for this study is taken from the pre-test questionnaire of the parent study, Lay Health Worker Model to Reduce Liver Cancer Disparities in Asian Americans, 2013 – 2014. A total of 600 foreign-born Asian adults, 18 years of age and older, were recruited from the community using a non-probability sampling strategy. Participants completed a self-administered questionnaire in the language of their choice

(English, Chinese, Korean, or Vietnamese). Specific measures from this pre-test questionnaire were used for the secondary data analysis employed in this study and are described here.

Measures

Depression

The Centers for Epidemiologic Studies Depression scale (CES-D) is a 20-item screening scale for depression that was used as the outcome measure for this study. The 20-items are each scored on a 4-point scale from 0 – 3, with "0" being "rarely or none of the time" and "3" being "most or almost all of the time." The 20-items were summed and a total score of 0 – 60 was created for each participant. Scores of 0 – 15 were coded as "0" while scores of 16 or greater were coded as "1". Those coded as 1 indicates reaching the threshold of 16, which is often used as the cutoff point for risk of depression when using the CES-D. Those coded as "1" were interpreted as being "depressed" while those coded as "0" were coded as "not depressed". Four items were reverse coded as according to the original scale. High internal reliability was shown with a coefficient alpha of 0.85 in Radloff's (1977) original study.

Perceived Discrimination

The discrimination variable was measured using a 7-item discrimination scale for Asians created by David Chae & Sunmin Lee (University of Maryland at College Park, not yet published) loosely based on the Everyday Discrimination Scale (Williams et al., 1997). Each item is scored on a scale of 0 – 5, with "0" being "never" and "5" being

"almost every day." The 7 items were summed to produce a total score, and then categorized. Participants that scored "0" represented a "none" group, those who scored 1 – 7 were in the "mild discrimination" group, and those who scored 8 or higher were in the "high discrimination" group. Prior to this study, this scale had not been tested for reliability.

A second 4-item measure labeled in this study as "unfair treatment" was also used to measure perceived discrimination. Each item is scored on a scale of 0 – 3 with "0" being "never" and "3" being "three times or more". Each of the four items scored were summed to create a total score of 0 – 12 and then dichotomized with those with a "1" representing "never" and those with "1 or higher representing "any unfair treatment".

Covariates

In this analysis, covariates included age, gender, ethnicity, income, and English proficiency. Age was categorized into three groups, 18 – 39 years old (reference), 40 – 59 years old, and 60 years and older. Gender was categorized into two groups, male as the reference and female as the second group. Ethnicity was categorized into three groups, Chinese as the reference group, Koreans, and Vietnamese. Family income was categorized into four groups: a family income of less than $20,000 as the reference group, a family income of $20,000 to less than $50,000, a family income of $50,000 to less than $90,000, and a family income of $90,000 or more. English proficiency was categorized into three groups: "fluent or well" as the reference, "so so", and "poor or not at all".

Statistical Analysis

Exploratory Data Analysis (EDA)

Univariate analysis was conducted to identify the distributions of each variable of interest. Bivariate analyses including t-tests for continuous variables, and chi-squared tests for categorical variables were conducted with depressive symptoms as a binary outcome. Correlations between variables were tested. Perceived discrimination was the primary independent variable of interest, which was captured using two variables as described, "discrimination" and "unfair treatment". The correlation between these two variables was tested to determine if a model with both perceived discrimination variables should be simulated or if two separate models, one with the 7-item discrimination variable labeled as "discrimination" and a second model with the 4-item discrimination variable labeled as "unfair treatment" should be used.

Logistic Regression

Based on the EDA simple logistic regression on each variable was conducted to produce unadjusted estimates. Step-wise logistic regression was completed with variables selected based on theory and the EDA. Nested models were compared using the likelihood ratio test (LRT), and model diagnostics were conducted including goodness of fit tests. Collinearity of variables was also tested. The best model was selected with considering the Akaike Information Criterion (AIC), goodness of fit tests, and the LRTs.

Missing Data

All analyses were conducted in Stata14. There were 38 cases missing for the "discrimination" model and 43 cases missing for the "unfair treatment" model. Multiple imputations were conducted in a 3-step process: imputation, completed-data analysis (estimation), and pooling. Multiple imputations consider the sampling variability due to missing data and assume a missing at random (MAR) pattern. Ten imputations were performed, resulting in a total sample of 600 that was used for the multiple logistic regression analyses. Analyses of the complete case data and multiply imputed data were similar and resulted in the same inferences. Differences are briefly described in the results, but only the multiply imputed data results are included.

Results

Sample description

Of the total sample, 58% were women, and the mean age was 47.3 years (SD 11.82) (Table 1). The sample was equally proportional: 33% percent were Chinese, 33% were Korean, and 34% were Vietnamese and all participants were foreign-born. Almost half of the total sample had at least a college degree, while approximately 25% of the sample had a family income of $20,000 or less. Nearly 79% were married or living with a partner. A total of 23.5% of the sample reported having "fluent or well" English proficiency. Self-rated general health was reported: 8% stated "excellent", 21% stated "very good", 32% stated "good", 35% stated "fair", and 4% stated "poor". The mean score was 3.4 (SD 6.6) for the self-reported number of days in the past 30 days that physical health was not good, while the mean score was 4.0 (SD 6.6) for the self-reported

number of days in the past 30 days that mental health was not good, with a range of 0 – 30 being reported for both items.

Measures

Exploratory factor analysis was conducted using three scales. Principal component factors and promax rotation were used, with screeplots and parallel analysis performed to identify the factors. A 7-item "discrimination" scale had a Cronbach's alpha of 0.94, a mean of 3.93 (SD 5.16) and scores ranging from 0 – 35 (Table 2). This produced a one-factor structure, with Eigenvalue of 5.10 and factor loadings of 0.82 – 0.89. The "unfair treatment" scale had 4 items, with a Cronbach's alpha of 0.62, a mean of 0.52 (SD 1.31), and scores ranging from 0 – 12. This also produced a one-factor structure with an Eigenvalue of 2.04, and factor loadings ranging from 0.60 – 0.78. The CES-D is a 20-item scale and had a Cronbach's alpha of 0.83, a mean of 11.66 (SD 8.13), and scores ranging from 0 – 45.

Bivariate Analysis of Total Sample

Depression

Of the total sample, 26% reported being depressed. Being depressed was statistically significantly different by ethnicity (p=0.006) and gender (p=0.007) (Table 3). Twenty-one percent of Chinese participants were "depressed", 34% of the Korean participants were "depressed", and 24% of the Vietnamese participants were "depressed". Thirty-three percent of males and 67% of females were depressed. Education, family income, English proficiency, and self-rated general, physical, and mental health were

each statistically significantly different when comparing by outcome of being depressed or not depressed.

Discrimination & Unfair Treatment

"Discrimination" and "unfair treatment" were reported as statistically significantly different between the three ethnic groups (Table 4). Forty-three percent of Chinese, 21% of Koreans, and 57% of Vietnamese reported "none" for "discrimination" when defined by the 7-item "discrimination" variable, ($p<0.001$, $n=590$), while 71% of Chinese, 80% of Koreans, and 82% of Vietnamese had "none" for "unfair treatment" ($p=0.02$, $n=588$).

Logistic Regression

Two final models were selected. "Discrimination" and "unfair treatment" exhibited a correlation of 0.39, representing a moderate correlation (Table 5). Due to the moderate correlation, "discrimination" and "unfair treatment" were modeled separately instead of being combined into one model. Model A included "discrimination" as a primary independent variable along with covariates of age, gender, ethnicity, family income, and English proficiency with depressive symptoms as an outcome for the total sample (Table 6). Model B included the same covariates and outcome, but with "unfair treatment" as the primary predictor (Table 7). Simple logistic regression indicated that "discrimination", age, gender, ethnicity, and family income were all statistically significantly different when comparing one or more groups to the reference category for each variable (Table 6). The crude estimates in Model B showed that "unfair treatment",

age, gender, ethnicity, and family income were statistically significantly different when comparing one or more groups to the reference category for each variable (Table 7).

Multiple Logistic Regression

MODEL A (Discrimination as primary predictor (Table 6)) & MODEL B (Unfair treatment as a primary predictor (Table 7))

Perceived discrimination ("discrimination" and "unfair treatment") significantly impacted depressive symptoms in multiple logistic regression analyses of the total sample (Table 6 & 7). The odds of reporting being depressed among participants who have "high discrimination" (score of 8 or higher) in the U.S. are 6.35 times greater than the odds of reporting being depressed among participants who have never experienced "discrimination" in the U.S. (OR=6.35, 95% CI=3.42, 11.77), while adjusting for all other covariates (Table 6). The odds of reporting being depressed among participants who have "mild discrimination" (score of 1 – 7) in the U.S. are 2.45 times greater than the odds of reporting being depressed among participants who have never experienced "discrimination" in the U.S. (OR=2.45, 95% CI=1.48, 4.06), while adjusting for all other covariates. The odds of reporting being depressed among participants who have had "any unfair treatment" (score of 1 or higher) in the U.S. were 2.76 times greater than the odds of reporting being depressed among participants who have never experienced "unfair treatment" in the U.S. (OR=2.76, 95% CI=1.73, 4.39), while adjusting for all other covariates (Table 7).

All covariates had significant findings for specific categories. Women were more likely to report being depressed compared to men, while adjusting for all other covariates

(OR=1.79, 95% CI= 1.18, 2.73 Model A; OR=1.66, 95% CI=1.10, 2.49 Model B). There was no statistically significant difference between Korean participants' odds of being depressed compared to the odds of Chinese participants being depressed, while adjusting for all other covariates, nor was their significance when comparing Vietnamese to Chinese.

Those with higher income had lesser odds of being depressed than those who reported a family income of less than $20,000, while adjusting for all other covariates in Model A. The income groups that had significantly lesser odds of being depressed were those who reported a family income of $90,000 or greater (OR=0.25; 95% CI= 0.12, 0.54, Model A; OR=0.30; 95% CI= 0.14, 0.63 Model B), when compared to those who reported a family income of less than $20,000, while adjusting for all other covariates. Those who reported a family income of $50,000 to less than $90,000 had 48% reduced odds of being depressed compared to those with a family income of less than $20,000 (OR=0.52, 95% CI=0.28, 0.97), while adjusting for all covariates for model A. For model B, those who had a family income of $20,000 to less than $50,000 had 41% reduced odds of being depressed compared to those whose family income was less than $20,000, while adjusting for all covariates (OR=0.59, 95% CI=0.36, 0.99). Being less than "fluent or well" in speaking English resulted in higher odds of being depressed, though not statistically significant, except for those who spoke "so so" for Model A (OR=2.23, 95% CI=1.21, 4.08 Model A; OR=2.48, 95% CI= 1.37, 4.49 Model B), while adjusting for all other covariates.

Ethnic group differences

When stratified by ethnicity, "discrimination" (Model A) was associated with depressive symptoms for both the "mild discrimination" and "high discrimination" group for Chinese and Vietnamese while adjusting for all other covariates, but only in the high category for Koreans (Table 8). Additionally, Chinese had the highest odds ratio reported among the three ethnic groups for those in the "mild discrimination" group for odds of being depressed compared to the odds of those who were not discriminated against; Chinese OR=2.71, 95% CI=1.01, 7.24; Korean OR=2.05, 95% CI= 0.68, 6.18; Vietnamese OR=2.08, 95% CI=0.99, 4.40 (Table 8). For the "high discrimination" group, Koreans reported the highest OR of the three ethnic groups: Chinese OR=5.19, 95% CI=1.61, 16.75; Korean OR=7.09, 95% CI=2.43, 20.68; Vietnamese OR=5.05, 95% CI=1.22, 20.87. "Unfair treatment" (Model B) was not statistically significant when stratified by ethnicity for Chinese, but was for Koreans and Vietnamese, with Vietnamese reporting the highest OR (OR=3.26, 95% CI= 1.38, 7.68), followed by Korean (OR=2.54, 95% CI=1.15, 5.58), and then Chinese (OR=2.16, 95% CI= 0.94, 4.99) (Table 9). However, most of the findings had wide confidence intervals suggesting that the sample size may be too small and that there is too much variability in the sample. Thus, these data should be interpreted with caution.

Age was statistically significant for Koreans in Model A, with a 3.30 times greater odds of being depressed for those who are 40 – 59 years old compared to those who are 18 – 39 years old, while adjusting for all covariates. Gender was statistically significant for Chinese, and Koreans for Model A and B, while adjusting for all other covariates, but not statistically significant for Vietnamese. Women had greater odds of

being depressed compared to men, while adjusting for all other covariates for Model A (OR=2.74, 95% CI=1.14, 6.59 Chinese; OR=2.55, 95% CI=1.22, 5.33 Korean). For Model B, Chinese women had 2.75 times greater odds of being depressed than men and Korean women had 2.27 times greater odds of being depressed than men, while adjusting for all other covariates (OR=2.75, 95% CI= 1.15, 6.54 Chinese; OR=2.27, 95% CI=1.13, 4.55). Koreans showed statistical significance in the $90,000 or higher group when compared to the reference group of less than $20,000 as the reported family income, while adjusting for all other covariates for Model A and B (OR=0.14, 95% CI=0.03, 0.73 Model A; OR=0.20, 95% CI= 0.04, 0.98 Model B). Additionally, Koreans whose income were in $50,000 to less than $90,000 had a 69% reduced odds of being depressed compared to those who are less than $20,000, while adjusting for all covariates (OR=0.31, 95% CI= 0.11, 0.91). Chinese had extremely higher odds of being depressed when comparing those whose English was "so so" compared to those whose English was "fluent or well", while adjusting for covariates in both models (OR=5.17, 95% CI=2.00, 13.39 Model A; OR=5.03, 95% CI= 1.99, 12.67 Model B).

Additional analyses of interactions of perceived discrimination (both variables of "discrimination" and "unfair treatment") with each covariate were conducted with depressive symptoms as the outcome. The only significant interaction was for those in the "high discrimination" group and with family income of $50,000 - $89,999, p=0.05. (Appendix C.1 [Table 11] & C.2 [Table 12]). Thus, this interaction represents a ratio of odds ratios: those who have "high discrimination" and whose family income is $50,000 - $89,999 compared to those who have "high discrimination" and whose family income is less than $20,000 (ratio of group 1) compared to those who have "no discrimination" and

whose family income is $50,000 - $89,999 compared to those who have “no discrimination” and whose family income is less than $20,000 (ratio of group 2), which is estimated to be 0.18, p=0.05. This suggests that there is less disparity in estimates comparing those with “high discrimination” than those with “no discrimination” when comparing family income of the $50,000 - $89,999 compared to the reference group.

There were minimal differences in statistical significance between the complete case data analysis and the MI analysis. For Model A in the total sample analysis there were no differences in statistical significance comparing the complete case data analysis to the multiply imputed data analysis. For Model B in the total sample analysis there was a statistical significance of the gender variable at the p=0.05 level for the multiply imputed data, while in the complete case data the p-value was slightly higher at p=0.06 indicating only marginal statistical significance. For Model A when stratified by ethnic group, the “mild discrimination” group was statistically significant at the p=0.05 level, but was only marginally significant at p=0.09 for the Chinese sample. Similarly, for the Vietnamese sample for the “mild discrimination” group had a statistically significant p-value of 0.05 in the multiply imputed data analysis, but had a marginal statistical significance at p=0.06 in the complete case data analysis. Lastly, for Model B in the ethnic group stratification, the “unfair treatment” variable was only marginally statistically significant at p=0.07, whereas it was statistically significant at p=0.05 in the complete case data analysis. Overall, the inferences of the data remained consistent between the two types of analyses. Additionally, the magnitudes of the estimates were very similar between the two types of analyses. Because of such, only the multiply imputed data is presented.

Discussion

This study sought to identify if perceived discrimination was associated with depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population. Additionally, it tried to determine if depressive symptoms were statistically different between the three ethnic groups, and if perceived discrimination was statistically different between the three ethnic groups. Similarly, it sought to determine if ethnicity impacted perceived discrimination's association to depressive symptoms.

Several key findings emerged from this research. First, perceived discrimination was statistically significantly associated with depressive symptoms among the entire sample, and 26% of the sample reported being depressed. Thus, over a quarter of the population sampled scored a 16 or higher on the CES-D, which is much higher than the 19% who scored 16 or higher in the initial study by Radloff (1977). The high percentage could indicate that foreign-born Chinese, Korean, and Vietnamese Americans do experience depressive symptoms at a high rate or that they interpret the CES-D differently in comparison to the general population, i.e., the CES-D has a cultural bias. However, the latter explanation is unlikely because the CES-D has been tested for cultural validity in Chinese and Korean populations (Gupta & Yick, 2001; G. Kim, DeCoster, Huang, & Chiriboga, 2011; Li & Hicks, 2010; Mackinnon, McCallum, Andrews, & Anderson, 1998; Noh, Avison, & Kaspar, 1992; Roberts, 1980; Ying, 1988).

Secondly, there were differences in depression and perceived discrimination estimates by ethnic group. The Korean population had 34% that reported being depressed, compared to 21% of Chinese, and 24% of Vietnamese. This represents one-fifth to one-third of Asian ethnic populations having depression, which is considered

high. Also, the Korean depression estimate mirrors that which was reported in Kim et al.'s (2015) meta-analysis. Koreans were statistically significantly different when compared to Chinese and Vietnamese, but Vietnamese were not statistically different when compared to Chinese for depressive symptoms. "Discrimination" was reported as statistically significantly different between the three groups, with Koreans perceiving "discrimination" the most, followed by Chinese, and Vietnamese with the least perceived discrimination. Chinese reported the most "unfair treatment", followed by Koreans, and Vietnamese with the least. Estimates were statistically significantly different comparing the three ethnic groups.

The Vietnamese immigration experience is uniquely different from that for Chinese and Koreans since most migrated to the U.S. as a result of the Vietnam War as refugees (CDC, 2008). The discrimination experienced in Vietnam during the war may have buffered them from feeling discriminated against in the U.S. For many Vietnamese refugees, the U.S. acted as a safe haven from persecution, and though discrimination may occur in the U.S., Vietnamese may not interpret acts of discrimination as such.

There is a greater population of Koreans compared to Chinese and Vietnamese in the Baltimore-Washington metro area (Hooper & Batalova, 2015; Rkasnuam & Batalova, 2014; Zong & Batalova, 2014). Additionally, Koreans are more likely to have come to the U.S. for employment (Zong & Batalova, 2014), and are owners of several grocery/corner markets in the Baltimore region (Cassie, 2013). Thus, Koreans may have more day-to-day exposure to other ethnic populations and as a result may report higher perceived discrimination.

Past research has shown that perceived discrimination is linked to negative physical and particularly mental health outcomes related to race/ethnicity (Williams et al., 2003), with some research identifying discrimination's association with poorer mental health (Williams & Williams-Morris, 2000; Williams et al., 1997) and cardiac symptoms (Hoggard et al., 2015) specifically in African Americans. Other research among U.S. Marines has shown that perceived discrimination is associated with negative physical health outcomes, while Kessler and colleagues (Kessler et al., 1999) have shown that perceived discrimination is linked to poor mental health in a national general population. Findings from this research were consistent with the minimal past literature indicating that perceived discrimination is associated with negative mental health outcomes for Asians (Bernstein et al., 2011; Gee, 2002; Gee et al., 2007; Hahm et al., 2010; Mossakowski, 2003; Noh & Kaspar, 2003). "Discrimination" significantly impacted depressive symptoms, as did "unfair treatment". The ORs increased with more "discrimination", where nearly 6.4 times greater odds of being depressed were seen among those who had "high discrimination" in comparison to those who had "none". While those with "mild discrimination" showing 2.45 times the odds of being depressed compared to those who had "none". These data suggest that perceived discrimination is clearly linked to negative mental health, specifically an increase in depressive symptoms. Thus, understanding what experiences are interpreted as discrimination, and how discrimination impacts depressive symptoms is needed in future studies. For example, do other factors mediate the relationship between discrimination and depressive symptoms?

Our findings showed that women were more likely to be depressed compared to men, which is also exhibited in the general population (Nolen-Hoeksema, 2001; Pratt &

Brody, 2014). Multiple logistic regression revealed that those with higher income were associated with lower depressive symptoms compared to those who reported an income of $0- $19,999. Thus, as expected, having a larger family income is associated with lower odds of depressive symptoms as seen in the literature (Noh & Kaspar, 2003), which is likely conceptually linked to financial burden and stress. Those who English proficiency are "so so" had the highest odds of being depressed compared to those who are "fluent or well" in speaking English. This suggests that having mediocre English proficiency is more impactful than having poor English fluency or none at all. As mentioned previously, prior research has indicated that low English proficiency has been linked to higher depressive symptoms among Asian populations (Bernstein et al., 2011).

Ethnicity Sub-Analyses

Ethnic sub-analyses showed that "high discrimination" resulted in varied odds ratios for the three ethnic groups. Koreans in the "high discrimination" group showed 7.09 times greater odds of being depressed compared Koreans with "no discrimination", while odds ratios for Vietnamese were 5.05 times as great and 5.19 times as great for Chinese when comparing those in the "high discrimination" group to those with "no discrimination". Thus, ethnicity seems to matter in terms of determining perceived discrimination's impact on depressive symptoms. Vietnamese had the highest odds ratio for "any unfair treatment" compared to "no unfair treatment" of the three ethnic groups. This suggests that "unfair treatment" bears more weight to Vietnamese than the other two ethnic groups, even though Vietnamese reported a smaller percentage of "any unfair treatment". This could be aligned with sentiments of the war in which "unfair treatment" could be linked to memories (or stories by younger generations) of being unfairly treated

by communists during the war. For those who escaped the war, "unfair treatment" could trigger intense negative memories that may typically be associated with depressive symptoms. Interestingly, Vietnamese for both the "discrimination" and "unfair treatment" models did not have statistically significant estimates for gender suggesting that gender may not influence one's depressive symptoms when other covariates are included in the model for Vietnamese.

There are multiple strengths to this study. First, this study examines a multi-ethnic Asian sample in a region with a high percentage of foreign-born Chinese, Vietnamese, and Koreans. The majority of the population recruited came from two states (Virginia and Maryland) that each have 6.0 percent of the total state population represented by Asians, which is higher than the national average of 5.1% of the U.S. population in 2012 being represented by Asians (Table 10). Similarly, the majority of the counties in which participants were recruited from had high percentages of Asians living in the counties compared to the national percentage of 5.1 (Table 10). This is the first study of its kind to include a community-based sample of these three populations of all foreign-born descent. Additionally, the community-engaged approach ensured that the population worked with researchers through each phase of the study. Likewise, the study used both native and English language as preferred by each participant, and the research staff was multilingual and multi-disciplinary.

Discrimination, as a topic, is a strength of the study as it is still an ongoing issue and has plagued this nation for centuries, particularly among the foreign-born Asian population. Specifically, discrimination among immigrant populations and more narrowly of Asian descent needs further investigation. These three ethnic groups share unique

histories that may coincide with different experiences of discrimination in the U.S. and this study is the only known study to examine these differences. Another strength of this study is that other factors were explored and controlled for including gender, age, ethnicity, family income, and English proficiency. Yet another strength was that strong measures were used in this study and were tested for reliability. The ethnicity sub-analyses of both Model A and Model B was a strength because it allowed for an examination of differences by ethnicity, and depicted differences among the three ethnic groups.

There were several limitations to this study including the purposive quota sampling that can result in selection bias. This population was unique because the participants all consented to a clinical study involving Hepatitis B screening. The willingness of these participants to have blood drawn for the study is likely not indicative of the general population. Additionally, because some of the recruitment occurred at religious venues, the sample population is not generalizable to the general population. However, S. Lee and Cheng (2006) have noted that the Asian population is often a hard to reach population and that ethnic based venues can be similar to the general population if done well. Additionally, one study (Juon et al. 2008) used this method and found similar percentages of ethnic populations and for other characteristics comparable to the U.S. census data.

Another limitation is that the "discrimination" variable is captured in your lifetime as the duration, while depression is captured in the past week. Thus, the CES-D does not capture a history of depression and may only capture current symptoms. There may be some participants who indeed have depression but there is a lack of such

information to capture this. Likewise, linking the recency of each incident of discrimination was not calculated in this analysis. Thus, when the experiences of discrimination took place could influence the effect it has on depressive symptoms. Lastly, missing data was a limitation due to self-report. Multiple imputations were conducted to provide estimates as a solution to missingness, and comparison to complete case data showed the same inferences. As with all self-report, there can be no assurance that responses are all accurate.

Asians in the U.S. are often referred to as the "model minority" and as such, can lead to them being overlooked as a population with potential mental illness and a need for culturally appropriate services. Future research is warranted to identify potential mediators and moderators of the relationship between perceived discrimination and depressive symptoms. For instance, stress may act as a mediator and should be examined in a future study. Additionally, further review of the differences between foreign-born and U.S.-born individuals at a community-based level in the Baltimore-Washington metro area would be worthwhile. National data from the NLAAS has identified that foreign-born Asians compared to U.S. born Asians report lower rates of mental disorders (Takeuchi, Hong, Gile, & Alegria, 2007; Takeuchi, Zane, et al., 2007). Therefore, understanding this comparison at the community-based level would be valuable. English proficiency was used as a proxy for acculturation in this study, and showed that poorer English proficiency in some cases is associated with higher odds of being depressed. Thus, understanding how all these factors intersect and interplay with nativity status is worth reviewing. This study is a first of its kind to examine the relationship between perceived discrimination and depressive symptoms among foreign-born Chinese,

Vietnamese, and Koreans in a community-based sample. Findings should encourage future research in uncovering why the association exists between perceived discrimination and depressive symptoms among these three foreign-born Asian populations.

Table 4.1. Descriptive table of total sample of foreign-born Asians, N=600		
	n	%
Age (years)	47.31±11.82	Range: 18 - 91
Ethnicity	n=600	
Chinese	201	33.5
Korean	198	33.0
Vietnamese	201	33.5
Gender	n=600	
Male	252	42.0
Female	348	58.0
Education	n=595	
<High School	86	14.5
High School graduate	152	25.6
Vocational School/Some college	72	12.1
College graduate	160	26.9
Graduate school or higher	125	21.0
Employment	n=597	
Not Employed	199	33.3
Employed	398	66.7
Marital Status	n=599	
Married/living with a partner	472	78.8
Separated/Divorced/Widowed	50	8.4
Single	77	12.9
Family Income	n=585	
<$20K	150	25.6
$20K- <$50K	214	36.6
$50K- <$90K	112	19.2
$90K+	109	18.6
English Proficiency	n=600	
Fluent or Well	141	23.5
So So	234	39.0
Poor or Not at all	225	37.5
Self-rated General Health	n=599	
Excellent	50	8.35
Very good	124	20.7
Good	193	32.2
Fair	209	34.9
Poor	23	3.8
Self-rated Physical and Mental Health	Mean (SD)	Range
# of days in past 30 days that physical health was not good	n=579 3.4 (6.6)	0 - 30
# of days in past 30 days that mental health was not good	n=584 4.0 (6.6)	0 – 30

Table 4.2. Psychometrics of Discrimination (N=589), Unfair Treatment (N=588), and the Centers for Epidemiologic Studies Depression Scale (CES-D) Measures (N=585)						
Measure	N	# of items	Alpha	Mean	SD	Range
Discrimination	589	7	0.94	3.93	±5.16	0 - 35
Unfair Treatment	588	4	0.62	0.52	±1.31	0 - 12
CES-D	585	20	0.83	11.66	±8.13	0 - 45

Table 4.3. Demographic variables by binary outcome score of being depressed (16+ score) or not depressed (0 – 15 score) with test statistics and p-values, N=600			
Variable	CES-D Score 0 – 15 (Not Depressed)	CES-D Score 16+ (Depressed)	Test Statistic
Mean Age	n=433 47.05, SD= 12.44	n=152 47.62, SD=9.85	t= -0.509 p<0.6107
Ethnicity %	n=433	n=152	
Chinese	79.50	20.50	
Korean	65.79	34.21	x^2=10.395 p=0.006
Vietnamese	76.41	23.59	
Gender %	n=433	n=152	
Male	79.76	20.24	x^2=7.324 p=0.007
Female	69.82	30.18	
Education %	n=428	n=152	
<High school	63.53	36.47	
High school graduate	74.66	25.34	x^2=16.543 p=0.002
Vocational School/Some college	87.32	12.68	
College graduate	67.74	32.26	
Graduate school or higher	79.67	20.33	
Employment %	n=430	n=152	
Not Employed	71.65	28.35	x^2=0.752 p=0.386
Employed	75.00	25.00	
Marital Status %	n=433	n=151	
Married/living with a partner	73.64	26.36	x^2=3.434 p=0.180
Separated/Divorced/ Widowed	67.35	32.65	
Single	81.58	18.42	
Family Income %	n=422	n=148	
<$20K	68.97	31.03	
$20K- <$50K	73.43	26.57	x^2=8.132 p=0.043
$50K- <$90K	71.82	28.18	
$90K+	84.26	15.74	
English Proficiency %	n=433	n=152	
Fluent or Well	85.00	15.00	x^2=12.66 p=0.002
So So	68.42	31.58	
Poor or Not at all	72.81	27.19	
Self-rated General Health	n=432 2.88, SD=1.02	n=152 3.49, SD=0.91	t= -6.610 p<0.001
Self-rated Physical and Mental Health			
Number of days in past 30 days that physical health was not good	n=421 2.59, SD=5.88	n=147 5.81, SD=8.11	t=-5.147 p<0.001
Number of days in past 30 days that mental health was not good	n=423 2.31, SD=4.69	n=149 8.79, SD=8.61	t=-11.407 p<0.001

Table 4.4. Chi Squared Test of Discrimination (n=590) and Unfair Treatment (n=588) by Foreign-born Asian Ethnicity									
Discrimination									
	Total		Chinese		Korean		Vietnamese		
	n	%	n	%	n	%	n	%	
Never	240	40.68	84	42.64	41	21.35	115	57.21	p<0.001
Mild (1-7 score)	236	40.68	84	42.64	80	41.67	72	35.82	
High (8+ score)	114	19.32	29	14.72	71	36.98	14	6.97	
Total	590	100.00	197	100.00	192	100.00	201	100.00	
Unfair Treatment									
	Total		Chinese		Korean		Vietnamese		
	n	%	n	%	n	%	n	%	
Never	458	77.89	138	71.13	155	80.31	165	82.09	p=0.020
Any (1+ score)	130	22.11	56	28.87	38	19.69	36	17.91	
Total	588	100.00	194	100.00	193	100.00	201	100.00	

Table 4.5. Correlation matrix of predictors for multiple logistic regression with mean, SD, and range, N=566										
	1	2	3	4	5	6	7	Mean	SD	Range
1. Discrimination	1.0000							1.78	0.74	1 - 3
2. Unfair Treatment	0.3920	1.0000						0.23	0.42	0 - 1
3. Age	-0.0525	-0.0182	1.0000					46.85	11.64	18 - 91
4. Gender	-0.0253	0.0090	0.0252	1.0000				1.58	0.49	1 - 2
5. Ethnicity	-0.1281	-0.1178	0.0737	-0.0240	1.0000			2.02	0.82	1 - 3
6. Family Income	0.1939	0.1031	-0.0232	-0.0120	-0.2966	1.0000		2.31	1.05	1 - 4
7. English Proficiency	-0.1015	-0.1242	0.3039	0.1254	0.3097	-0.3526	1.0000	2.13	0.77	1 - 3

Table 4.6. Model A, Multiple logistic regression crude estimates and adjusted model of discrimination and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data				
	Crude, n=600		Adjusted, n=600	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value
Discrimination				
None (0 score)	Reference		Reference	
Mild (1 - 7 score)	1.98 (1.25, 3.14)	0.004**	2.45 (1.48, 4.06)	0.001***
High (8+ score)	5.06 (3.00, 8.53)	0.001***	6.35 (3.42, 11.77)	0.001***
Age (years)				
18 - 39	Reference		Reference	
40 - 59	1.53 (0.96, 2.46)	0.08	1.53 (0.89, 2.63)	0.13
60 and older	1.09 (0.55, 2.14)	0.81	1.02 (0.48, 2.18)	0.96
Gender				
Male	Reference		Reference	
Female	1.73 (1.18, 2.55)	0.005**	1.79 (1.18, 2.73)	0.006**
Ethnicity				
Chinese	Reference		Reference	
Korean	1.96 (1.25, 3.09)	0.004**	0.96 (0.55, 1.66)	0.87
Vietnamese	1.22 (0.76, 1.95)	0.42	0.99 (0.57, 1.70)	0.96
Family Income				
$0 - <$20,000	Reference		Reference	
$20,000 - <$50,000	0.80 (0.51, 1.28)	0.36	0.62 (0.37, 1.04)	0.07
$50,000 - <$90,000	0.89 (0.52, 1.32)	0.67	0.52 (0.29, 0.97)	0.04*
$90,000 or more	0.41 (0.22, 0.77)	0.005**	0.25 (0.12, 0.54)	0.001***
English Proficiency				
Fluent or Well	Reference		Reference	
So So	2.56 (1.49, 4.39)	0.001***	2.23 (1.21, 4.08)	0.01**
Poor or Not at all	2.09 (1.21, 3.62)	0.009**	1.60 (0.83, 3.10)	0.16
*p<.05, **p<.001, ***p<.001				

Table 4.7. Model B, Multiple logistic regression crude estimates and adjusted model of unfair treatment and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data				
	Crude, n=600		Adjusted, n=600	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value
Unfair Treatment				
None (0 score)	Reference		Reference	
Any (1+ score)	2.21 (1.45, 3.37)	0.001***	2.76 (1.73, 4.39)	0.001***
Age (years)				
18 - 39	Reference		Reference	
40 - 59	1.53 (0.96, 2.46)	0.08	1.46 (0.86, 2.49)	0.16
60 and older	1.09 (0.55, 2.14)	0.81	0.84 (0.40, 1.76)	0.65
Gender				
Male	Reference		Reference	
Female	1.73 (1.18, 2.55)	0.005**	1.66 (1.10, 2.49)	0.02*
Ethnicity				
Chinese	Reference		Reference	
Korean	1.96 (1.25, 3.09)	0.004**	1.63 (0.97, 2.72)	0.07
Vietnamese	1.22 (0.76, 1.95)	0.42	0.92 (0.54, 1.57)	0.77
Family Income				
$0 - <$20,000	Reference		Reference	
$20,000 - <$50,000	0.80 (0.51, 1.28)	0.36	0.59 (0.36, 0.99)	0.04*
$50,000 - <$90,000	0.89 (0.52, 1.32)	0.67	0.63 (0.35, 1.13)	0.12
$90,000 or more	0.41 (0.22, 0.77)	0.005**	0.30 (0.14, 0.63)	0.002**
English Proficiency				
Fluent or Well	Reference		Reference	
So So	2.56 (1.49, 4.39)	0.001***	2.48 (1.37, 4.49)	0.003**
Poor or Not at all	2.09 (1.21, 3.62)	0.009**	1.61 (0.84, 3.07)	0.15
*p<.05, **p<.001, ***p<.001				

Table 4.8: Model A, Multiple logistic regression adjusted model of discrimination and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score) by foreign-born Asian ethnicity, Chinese (n=201), Korean (n=198), Vietnamese (n=201), multiple imputed data						
	Chinese		Korean		Vietnamese	
	Adjusted, n=201		Adjusted, n=198		Adjusted, n=201	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Discrimination						
None (0 score)	Reference		Reference		Reference	
Mild (1-7 score)	2.71 (1.01, 7.24)	0.05*	2.05 (0.68, 6.18)	0.20	2.08 (0.99, 4.40)	0.05*
High (8+ score)	5.19 (1.61, 16.75)	0.006**	7.09 (2.43, 20.68)	0.001***	5.05 (1.22, 20.87)	0.03*
Age (years)						
18 - 39	Reference		Reference		Reference	
40 - 59	1.23 (0.43, 3.53)	0.70	3.30 (1.09, 9.99)	0.04*	0.78 (0.31, 1.98)	0.60
60 and older	0.82 (0.23, 2.94)	0.77	2.18 (0.46, 10.40)	0.33	0.68 (0.18, 2.50)	0.56
Gender						
Male	Reference		Reference		Reference	
Female	2.74 (1.14, 6.59)	0.02*	2.55 (1.22, 5.33)	0.01**	0.89 (0.44, 1.83)	0.76
Family Income						
$0 - <$20,000	Reference		Reference		Reference	
$20,000 - <$50,000	0.68 (0.21, 2.15)	0.51	0.48 (0.19, 1.23)	0.13	0.61 (0.27, 1.36)	0.22
$50,000 - <$90,000	1.10 (0.32, 3.73)	0.88	0.31 (0.11, 0.91)	0.03*	0.81 (0.26, 2.54)	0.72
$90,000 or more	0.40 (0.11, 1.43)	0.16	0.14 (0.03, 0.73)	0.02*	0.28 (0.06, 1.31)	0.11
English Proficiency						
Fluent or Well	Reference		Reference		Reference	
So So	5.17 (2.00, 13.39)	0.001**	0.96 (0.32, 2.85)	0.94	1.38 (0.37, 5.11)	0.63
Poor or Not at all	1.63 (0.43, 6.19)	0.47	0.78 (0.25, 2.39)	0.66	1.65 (0.41, 6.61)	0.48
*p<.05, **p<.001, ***p<.001						

Table 4.9. Model B, Multiple logistic regression adjusted model of unfair treatment and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score) by foreign-born Asian ethnicity, Chinese (n=201), Korean (n=198), Vietnamese (n=201), multiple imputed data						
	Chinese		Korean		Vietnamese	
	Adjusted, n=201		Adjusted, n=198		Adjusted, n=201	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Unfair Treatment						
None (0 score)	Reference		Reference		Reference	
Any (1+ score)	2.16 (0.94, 4.99)	0.07	2.54 (1.15, 5.58)	0.02*	3.26 (1.38, 7.68)	0.007**
Age (years)						
18 - 39	Reference		Reference		Reference	
40 - 59	1.22 (0.44, 3.37)	0.71	3.55 (1.24, 10.18)	0.02*	0.61 (0.24, 1.57)	0.31
60 and older	0.71 (0.21, 2.41)	0.58	1.74 (0.39, 7.70)	0.47	0.52 (0.14, 1.90)	0.32
Gender						
Male	Reference		Reference		Reference	
Female	2.75 (1.15, 6.54)	0.02*	2.27 (1.13, 4.55)	0.02*	0.76 (0.38, 1.54)	0.45
Family Income						
$0 - <$20,000	Reference		Reference		Reference	
$20,000 - <$50,000	0.65 (0.21, 2.04)	0.46	0.53 (0.22, 1.30)	0.16	0.52 (0.23, 1.17)	0.11
$50,000 - <$90,000	1.12 (0.35, 3.60)	0.85	0.42 (0.15, 1.16)	0.10	0.90 (0.30, 2.75)	0.86
$90,000 or more	0.42 (0.12, 1.42)	0.16	0.20 (0.04, 0.98)	0.05*	0.37 (0.08, 1.63)	0.19
English Proficiency						
Fluent or Well	Reference		Reference		Reference	
So So	5.03 (1.99, 12.67)	0.001***	1.23 (0.43, 3.53)	0.70	1.93 (0.52, 7.13)	0.32
Poor or Not at all	1.28 (0.35, 4.69)	0.70	0.90 (0.31, 2.60)	0.84	2.08 (0.52, 8.36)	0.30
*p<.05, **p<.001, ***p<.001						

Table 4.10. 2012 U.S. Census Bureau Estimates of the Asian population by county, state, and national level where recruitment occurred		
County (2012 estimates)	**Asian Alone (%)**	**Total population (all races)**
USA	5.1	313,873,685
Maryland	6.0	5,884,868
Baltimore City	2.5	622,417
Baltimore County	5.4	817, 682
Howard	15.7	299,356
Montgomery	14.7	1,004,476
Prince George's	4.4	881,419
District of Columbia	3.8	633,427
Virginia	6.0	8,186,628
Arlington	9.9	221,275
Fairfax	18.4	1,118,683
Prince William	8.1	430,100

CHAPTER FIVE: MANUSCRIPT THREE

Perceived social support and perceived stress as mediators and moderators of the relationship between perceived discrimination and depressive symptoms among foreign-born Asians in the U.S.

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Abstract

Objective: The objective of this study was to determined if perceived social support and perceived stress act as mediators or moderators in the relationship between perceived discrimination and depressive symptoms in a foreign-born Asian sample.

Methods: This study used data from a parent study and included 600 total foreign-born Asians of equal proportions of Chinese, Korean, and Vietnamese from a metropolitan area in the U.S. Multiple linear regression was used to test five sub-aims, three mediating aims and two moderating aims among the total sample as well by ethnic group in sub-analyses.

Results: Findings indicated that ethnic group differences exist. Perceived stress was a mediator in the relationship between perceived discrimination and depressive symptoms and perceived social support was also a mediator in both the total sample, and separate ethnic group level analyses. In a multiple mediator model, both perceived stress and perceived social support mediated the relationship, but perceived stress had more effect in the total sample. However, in the ethnic group sub-analyses the Chinese and the Vietnamese samples did not have perceived social support as a mediator in the multiple mediator analyses. Perceived social support did not moderate the relationship between perceived discrimination and depressive symptoms in the total sample or by ethnic group sub-analyses. However, perceived stress was a moderator for the total sample and for the Vietnamese sample.

Conclusions: This research was novel and showed that perceived stress and perceived social support are important intermediate variables in the relationship between perceived

discrimination and depressive symptoms. Additionally, it showed that ethnic group differences exist. Future studies should further explore the role of perceived stress and depressive symptoms among U.S.-born Asians and if it is different form foreign-born Asians.

Introduction

Depression

Depression is a worldwide known debilitating mental illness, afflicting 350 million people each year (WHO, 2012). In the U.S., 8% of the U.S. population 12 years or older has a diagnosis of major depressive episode (CDC, 2012). Depression is also associated with disability and major health costs (WHO, 2012). Because of such, it is an illness that should be better identified among vulnerable populations.

In the U.S., limited research of the current state of mental health among the Asian population, specifically regarding depression exists. Of the existing research, findings are mixed. Some research states that the Asian population in the U.S. have lower rates of depression compared to other races and ethnicities (Jackson et al., 2011; Takeuchi, Hong, Gile, & Alegria, 2007; Takeuchi, Zane, et al., 2007), while other research states that some Asian populations exhibit high rates of depression (Hurh & Kim, 1988, 1990; H. J. Kim et al., 2015; Kuo, 1984; Tran et al., 2007; Ying, 1988). In addition, limited data exists between differences by Asian ethnic group. A meta-analysis by H. J. Kim and colleagues (2015) revealed differences in depression estimates, and that the CES-D was the most commonly used tool for depression. Additionally, the majority of studies which met the criteria for the meta-analysis targeted the Korean population compared to other Asian ethnic groups, and found that the pooled prevalence using the CES-D was quite high; 33.3% (95% CI=27.5, 39.1) for Koreans, while for the whole sample the pooled prevalence using the CES-D was 35.6 (95% CI= 27.6, 43.7). Though a consensus on rates of depression among Asians compared to other races and ethnicities may not yet exist, there is an established knowledge among the research community that Asians

consistently have low rates of use of mental health services (Leong & Lau, 2001; Sue et al., 2012).

Perceived Discrimination and Depressive Symptoms

Understanding the current state of depression among the Asian population in the U.S. is important because this is the fastest growing minority in the U.S. (U.S. Census Bureau, 2012). Given the known burdens associated with depression, such as suicide, it is beneficial for the research community to explore factors that lead to depression among the Asian population. Prior research has indicated that perceived discrimination is associated with depressive symptoms in multiple populations (Bernstein et al., 2011; Gee et al., 2007; Mossakowski, 2003; Noh & Kaspar, 2003). Some data has shown this relationship among Asians. Data from the National Latino and Asian American Study (NLAAS) showed that perceived discrimination was linked with depressive symptoms (Gee et al., 2007; Hahm, et al., 2010). Likewise, a community study of Korean immigrants also uncovered this association (Bernstein et al., 2011; Noh & Kaspar, 2003).

Perceived Stress and Perceived Social Support

In addition to perceived discrimination, there is literature which theorizes that stress is associated with depressive symptoms (Brown & Harris, 1978; Cohen, Karmarck, & Mermelstein, 1983; Dohrenwend & Dohrenwend, 1974; Lazarus & Folkman, 1984; Pearlin, 1989; Pearlin, Menaghan, Morton, & Mullan, 1981; Pearlin, Mullan, Semple, & Skaff, 1990). Specifically, perceived stress has been linked to depressive symptoms among college students (Cohen et al., psychiatric patients (Hewitt, Flett, & Mosher, 1992), and adults in a Swedish population (Bergdahl & Bergdahl, 2002). Perceived stress

is one's perception of stressful events affecting one's life (Cohen et al., 1983). Similarly, social support has been linked to reduced depression, indicating that social support is associated with reduced depressive symptoms (Cohen & Wills, 1985; Oxman, Berkman, Kasl, Freeman, & Barrett, 1992; Penninx et al., 1998). Often defined as emotional, instrumental, tangible, and informational, social support is the assistance given to an individual by their social ties (House et al., 1985). Social support has been associated with positive health effects (Berkman, Glass, Brissette, & Seeman, 2000; Cobb, 1976; Cohen & Wills, 1985; House, Kahn, McLeod, & Williams, 1985; House, Umberson, & Landis, 1988; Thoits, 1995). For instance, Thoits (1995) describes that perceived emotional support is often associated with improved mental health. In studies specific to the Asian population, it has been shown that social support can reduce one's acculturative stress and depression (Mui, 2001; Yeh & Inose, 2003; Sangalang & Gee, 2012; Han, Kim, Lee, Pistulka, & Kim, 2007; Chae et al., 2012).

Mediators and Moderators

Social support has been studied as both a mediator and moderator in the relationship between perceived stress and depressive symptoms. In Pearlin and colleagues' Stress Process Theory (1981) social support acts as a mediator. This theory centers on stress. It states that stress exists in two forms, chronic life events and discrete life events which act as "sources of stress", while "mediators of stress" such as social support exist in the path to affect the "manifestation of stress" (the outcome of stress), which is commonly defined as depression in studies. In contrast, the Social Support Buffering Theory (Cohen & Wills, 1985) has shown that social support may act as a moderator to buffer against stress's effect on depressive symptoms, suggesting that those

with higher stress benefit greater from perceived social support. Studies have examined the role of social support between stress and mental health among Asians (Tang et al., 2007; Xu & Chi, 2013). For instance, one study showed that perceived social support partially mediates the relationship between stress and depressive symptoms among Asian immigrants (Xu & Chi, 2013) while another showed perceived social support does not moderate life event's impact on poor mental health on Chinese immigrant women (Tang et al., 2007).

There is limited literature that investigates the potential intermediate variables such as perceived stress and perceived social support that may intervene specifically between perceived discrimination and depressive symptoms. One study showed that perceived discrimination interacts with social support networks to moderate the effect of perceived discrimination on depressive symptoms among three European immigrant populations (Jasinskaja-Lahti, Liebkind, Jaakkola, & Reuter, 2006). Similarly, a study by Noh and Kaspar (2003) found that coping and social support were moderators in the relationship between perceived discrimination and depressive symptoms among Korean immigrants in Canada. Likewise, a study by Chae and colleagues (2012) showed that at lower levels of discrimination perceived social support buffered against poor mental health. However, a study of African American college students did not support the social support buffering of perceived discrimination's effect on depressive symptoms (Prelow, Mosher, & Bowman, 2006). Other moderators of the relationship of perceived discrimination on psychological distress included self-esteem among women (Corning, 2002), while ethnic identification was seen as a moderator of perceived discrimination on depressive symptoms among Filipinos by gender (Mossakowski, 2003) and Southeast

Asians (Mossakowski, 2003; Noh et al., 1999). Overall, the role of perceived social support on perceived discrimination among Asians remains mixed.

Mediation of the relationship between perceived discrimination and depressive symptoms is not well understood in the literature. Few studies describe the possible mediators in this pathway. One study shows that self-esteem may be a partial mediator for this relationship (Cassidy, O'Connor, Howe, & Warden, 2004). Although with a different outcome measure of chronic illnesses, another study by Gee and colleagues (2007) suggest that perceived stress may mediate a relationship between perceived discrimination and chronic illnesses.

Current research has explored the role of perceived stress and perceived social support as it relates to depressive symptoms in different contexts, sometimes in a mediating or moderating role, but there is only one known study that examines if perceived stress and perceived social support act as mediators or moderators (Chae et al., 2012) specifically in the relationship between perceived discrimination and depressive symptoms among the Asian population in the U.S. Thus, this paper seeks to explore the relationship between perceived discrimination, and depressive symptoms by testing if perceived social support and perceived stress act as mediators or moderators in this relationship among three Asian immigrant populations.

Specific Mediation Aims:

1. To determine if perceived social support partially mediates the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

2. To determine if perceived stress partially mediates the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

3. To determine if perceived social support and perceived stress act as multiple mediators in the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

Specific Moderation Aims:

4. To determine if perceived social support interacts with perceived discrimination to moderate the association of perceived discrimination with depressive symptoms among an Asian foreign-born sample.
5. To determine if perceived stress interacts with perceived discrimination to moderate the association of perceived discrimination with depressive symptoms among an Asian foreign-born sample.

Lastly, sub-analyses were conducted on all five aims stratified by the three Asian ethnic groups.

Methods

Procedure

The data used in this study were from the pre-test questionnaire issued as the first step of the parent study. No other components of the parent study were used. After consenting, participants were given the self-questionnaire (in English, Chinese, Korean, or Vietnamese) to be completed and were given the option of a bilingual interviewer if

needed. Specific measures were used from the pre-test questionnaire for analysis and are described here.

Measures

Depression

The Centers for Epidemiologic Studies Depression scale (CES-D) is a 20-item screening scale for depression that was used as the outcome measure for this study. The 20-items are each scored on a 4-point scale from 0 – 3, with "0" being "rarely or none of the time" and "3" being "most or almost all of the time." The 20-items were summed and a total score of 0 – 60 was created for each participant. Four items were reverse coded as according to the original scale. High internal reliability was shown with a coefficient alpha of 0.85 in the original study. The reliability (Cronbach's alpha) of the CES-D for this sample was 0.83.

Perceived Discrimination

Perceived discrimination was measured using a 7-item discrimination scale for Asians created by David Chae & Sunmin Lee of the University of Maryland College Park (not yet published) based on the Everyday Discrimination Scale (Williams et al., 1997). Each item is scored on a scale of 0 – 5, with "0" being, "never" and "5" being, "almost every day." The 7 items were summed to produce a total score of 0 – 35. Prior to this study, the perceived discrimination scale created by Chae and Lee had not been tested for reliability. An analysis by the author (Chau) revealed a Cronbach's alpha of 0.94 for this sample population.

Perceived Social Support

The Duke-UNC Functional Social Support Questionnaire (Broadhead, Gehlbach, de Gruy, & Kaplan, 1988) is also included in the pre-test instrument. This is an 8-item measure that originally was for use in family clinical settings, but has been applied in other venues since its development. It is scored on a 1 – 5 scale from "1" being, "much less than I would like" and "5" being, "as much as I would like." The scores are summed to produce a total of 10 – 40 and divided by eight to produce an average social support score of 1 – 5. Higher average scores indicate higher perceived social support. The average test-retest correlation was 0.66 for the original study. For this study's sample, the scale had a Cronbach's alpha of 0.94 with only one factor.

Perceived Stress

The Perceived Stress Scale (Cohen et al., 1983), is the third scale included in the pre-test questionnaire. It is a 10-item measure that assesses the level of stress created by common situations, as the individual perceives it. The objective of the scale is to determine the perception of the stress in one's life. It purposely includes general questions that are not specific to any sub-population and refers to these feelings experienced within the last month. The questions are scaled 1 – 5, with "1" being "never" to "5" being "very often." Six questions are positively stated and are reversed scored when scoring. Summing the 10 questions after reverse scoring of the positive questions produces a total score of 10 – 50. Higher scores indicate higher perceived stress. The Perceived Stress Scale reliability was indicated with an alpha of 0.85 in the original study. It has been shown to be predictive of health outcomes including depressive

symptomology in the past (Cohen et al., 1983). The reliability of the scale determined by the Cronbach's alpha was 0.72 based on this study's sample.

Covariates

In this analysis, possible covariates between perceived discrimination and its effect on depressive symptoms were tested. These covariates included in the mediation and moderation analysis were age, gender, family income, and English proficiency. Age was categorized into three groups, 18 – 39 years old (reference), 40 – 59 years old, and 60 years and older. Gender was categorized into two groups, male as the reference and female as the second group. Family income was categorized into four groups: a family income of less than $20,000 as the reference group, a family income of $20,000 to less than $50,000, a family income of $50,000 to less than $90,000, and a family income of $90,000 or more. English proficiency was categorized into three groups: "fluent or well" as the reference, "so so", and "poor or not at all". Ethnicity was also included for the moderation analyses and included three groups, Chinese as the reference group, Koreans, and Vietnamese.

Analysis Plan

Exploratory data analysis was conducted and the CES-D outcome variable displayed a normal distribution. Both perceived social support and perceived stress were coded as continuous variables, while the outcome variable was also continuous. The primary independent variable of perceived discrimination was coded as a continuous variable (score of 0 – 35) for the mediation analyses and as an ordered categorical variable for the moderation analyses. The three categories were "no discrimination"

defined by a score of 0, "mild discrimination" defined by a score of 1 – 7, and "high discrimination" defined by a score of 8 or more. Perceived discrimination was categorized in the moderation analyses for easier interpretation of the interaction term, specifically so that a categorical by continuous interaction could be modeled.

Multiple linear regression was used to test all of the mediation and moderation aims. The CES-D outcome variable was coded as a continuous summary score. Mediation was tested using Baron and Kenny's meditational analysis steps (Baron & Kenny, 1986). To test mediation, three regression equations were performed for each mediation analysis (See Figure 1). For Aim 1 of this study, the first regression model included the primary predictor of perceived discrimination with covariates and an outcome of depressive symptoms. The second regression model included perceived social support (the mediator of interest) as the outcome variable, and perceived discrimination as the primary predictor with the same covariates in the model. The third regression model included both the mediator of perceived social support and the primary predictor of perceived discrimination with covariates and the outcome of depressive symptoms. If the coefficient for perceived discrimination was reduced in the third equation and was both statistically significant in all three equations, and if perceived social support was also statistically significant in equation three, then partial mediation had occurred. For the remaining mediations this conceptual process was repeated. The moderation aims were tested using interaction terms generated in Stata14. All analyses were conducted in Stata14. Complete case data were used for the final analyses.

Results

Participants

The pre-test data used was taken from a 2012 – 2014 parent study on hepatitis B and liver cancer prevention. There were 600 total foreign-born Asian adults 18 years and older, with the majority (97%) of the sample being 18 – 65 years old and the mean age being 47.31 years old (SD±11.82) (Table 1). Fifty-eight percent of the participants were female, and the sample was equally distributed by three Asian ethnic groups: Chinese, Korean, and Vietnamese. Eighty-five percent of the sample was at a least high school graduate, while two-thirds of the sample was employed. Nearly 79% were married or living with a partner. Approximately 26% of the sample had a family income that was less than $20,000; meanwhile nearly 19% had a family income of $90,000 or more. Twenty-three and a half percent of the sample reported their English proficiency as being "fluent or well", 39% reported it as "so so", and 37.5% reported it as "poor or not at all". Regarding general health, approximately 39% reported their health to be "fair" or "poor", and only 8% reported it to be "excellent". Self-rated physical, and mental health were each rated well; 3.4 (SD±6.6) days of the past 30 days were not good and 4.0 (SD±6.6) days of the past 30 days were not good on average for the sample. All participants consented to participate in the parent study with written consent.

Measures

Exploratory factor analysis was conducted prior to multiple linear regression analysis. Three scales were used, a 7-item discrimination scale with a Cronbach's alpha of 0.94, a mean of 3.93 (SD 5.16) and scores ranging from 0 – 35 (Table 2). As

previously noted, this measure was used as a continuous variable for the mediation analyses and then categorized into an ordered categorical variable for the moderation analyses for easier interpretation of the interaction. The perceived stress scale includes 10 items, with a Cronbach's alpha of 0.72, a mean of 25.54 (SD 5.85), with scores ranging from 10 – 41, with 50 as a possible maximum score. The perceived social support scale includes 8 items, and had a Cronbach's alpha of 0.94, a mean of 29.07 (SD 8.05), and a range of 8 – 40 (prior to dividing by eight for the final score). The final mean score after dividing the total score by eight for the final score was 3.63 (SD 1.01), with a range of 1 – 5. The CES-D is a 20-item scale, with a Cronbach's alpha of 0.83, a mean of 11.66 (SD 8.13), and scores ranging from 0 – 45. A correlation matrix of the variables is seen in Table 3.

Bivariate Comparisons

In simple linear regression with an outcome of depressive symptoms, perceived discrimination as a continuous predictor variable was associated with depressive symptoms among the total sample, B=0.45, 95% CI=0.33, 0.58. When categorized as an ordered categorical variable in simple linear regression, perceived discrimination was associated with depressive symptoms among the total sample for the "high discrimination" group, B=5.87, 95% CI=4.11, 7.64. Also, perceived social support was associated with depressive symptoms among the total sample, B=-3.53, 95% CI= -4.14, -2.91. Likewise, perceived stress was associated with depressive symptoms, B= 0.80, 95% CI=0.70, 0.89 among the total sample. When stratified by ethnic group perceived discrimination was associated with depressive symptoms as was perceived social support and perceived stress (Table 4).

Mediation Models: Total Sample

Multiple linear regression was conducted with covariates of age, gender, family income, and English proficiency for all mediation models.

Mediation Aim 1 (Table 5 and Figure 2)

Table 5 presents data from aim one and shows that perceived social support mediated the relationship between perceived discrimination and depressive symptoms. Overall the total effect of perceived discrimination on depressive symptoms was B=0.48, with an indirect effect of B=0.17 and a direct effect of perceived discrimination of B=0.31. Each pathway was statistically significant at the p=0.001 level. The proportion of total effect mediated by perceived social support was 0.35, while the adjusted R^2 was largest in step three indicating that perceived discrimination and perceived social support explained 23% of the variance of depressive symptoms.

Mediation Aim 2 (Table 6 and Figure 3)

The second aim of this study was to determine if perceived stress mediated the relationship between perceived discrimination and depressive symptoms, and results showed that it was a mediator. Overall, all predictors and mediating variables were statistically significant at the p=0.001 level. The total effect of perceived discrimination on depressive symptoms was B=0.75, while the indirect effect of perceived stress was B=0.12, and the direct effect of perceived discrimination was B=0.26. The proportion of total effect of perceived discrimination on depressive symptoms mediated by perceived stress was 0.46, and the adjusted R^2 was 0.36.

Mediation Aim 3 (Table 7 and Figure 4)

The third aim of this study was to determine if perceived social support and perceived stress acted as multiple mediators in affecting depressive symptoms. Overall, perceived discrimination's total effect on depressive symptoms was 0.46, while the proportion of the total effect mediated was 0.53. Both perceived social support and perceived stress were statistically significant mediators, with perceived stress having greater impact as a mediator compared to perceived social support. The total indirect effect of the multiple mediator model was B=0.24, while the total direct effect was B=0.22, each significant at the p=0.001 level.

Mediation Models: Ethnic Groups

Mediation Aim 1 (Table 8 and Figure 5)

The first aim of this study was statistically significant for each of the three mediation steps when stratified by ethnic group. The findings showed that there were differences by ethnic group. The total effect of perceived discrimination on depressive symptoms was greatest for Vietnamese (B=0.73) followed by Koreans (B=0.49), and last was Chinese (B=0.26). However, the proportion of total effect mediated was greatest in Chinese (0.52), followed by Koreans (B=0.38), and last Vietnamese (B=0.23). Thus, perceived social support mediates the relationship between perceived discrimination and depressive symptoms among each of the three ethnic groups, though its impact varies by group. Chinese had an adjusted R^2 of 0.25, while it was 0.24 for Koreans, and 0.19 for Vietnamese for step three, which indicates the variance in depressive symptoms explained by the mediation.

Mediation Aim 2 (Table 9 and Figure 6)

The second aim of this study indicated perceived stress was a mediator in the path between perceived discrimination and depressive symptoms for each of the ethnic groups. The total effect of perceived discrimination on depressive symptoms followed the same pattern of magnitude as in aim 1: Vietnamese (B=0.71), Korean (B=0.49), and lastly Chinese (B=0.27). However, for the total effect mediated there was a slight change in pattern in order of greatest magnitude compared to aim 1: Chinese (B=0.51), Vietnamese (B=0.42), and Korean (B=0.39). Overall, perceived stress significantly mediated the relationship between perceived discrimination and depressive symptoms. The adjusted R^2 was 0.42 for Chinese, 0.33 for Koreans, and 0.31 for Vietnamese for step three of the mediation analysis, indicating greater variance explained by the perceived stress mediation than the perceived social support mediation.

Mediation Aim 3 (Table 10 and Figure 7)

The multiple mediator model depicted by aim three, showed different results based on ethnic group. For Chinese, perceived social support was not statistically significant in being a mediator, although perceived stress was a statistically significant mediator. Thus, the total effect for the multiple mediator model was B=0.24, with the proportion of it being mediated being 0.66. For Koreans, both perceived social support and perceived stress were statistically significant in the multiple mediator model as mediators. The total effect of perceived discrimination on depressive symptoms for Koreans in the multiple mediator model was B=0.45, with 52% of the effect being mediated. Vietnamese, like the Chinese, did not have perceived social support act as a

statistically significant mediator in the multiple mediator model, although perceived stress was significant. The total effect mediated for Vietnamese was B=0.70, with 42% of the effect being mediated. Perceived stress was a greater mediator than perceived social support for Koreans. Thus, ethnic group differences exist and only Koreans showed perceived social support as a statistically significant mediator in the multiple mediator model (aim three).

Moderation Models: Total Sample

Centering variables

The moderating variables for the analyses were centered at the mean for easier interpretation. Thus, results describe estimates centered at the mean for perceived social support and perceived stress. The covariates for the moderation analyses included age, gender, ethnicity, family income, and English proficiency.

Moderation Aim 4 & 5 (Table 11 and Figure 8)

The fourth aim of this study was to test if perceived discrimination and perceived social support interacted to affect depressive symptoms, while holding all covariates constant. This analysis showed that perceived social support does not interact with perceived discrimination to affect depressive symptoms among the total sample (Figure 8). However, aim five was supported because perceived stress interacted with perceived discrimination to affect depressive symptoms at a statistically significant level ($p<0.05$). A one-point increase above the mean in perceived stress was associated with a 0.59-point increase in depressive symptoms (B=0.59, 95% CI=0.47, 0.72). Those with "mild discrimination" compared to those with "no discrimination" had a 1.64-point increase in

depressive symptoms (B=1.64, 95% CI=0.36, 2.93), while the "high discrimination" group compared to the "no discrimination" group had a 2.49-point increase in depressive symptoms (B=2.49 95% CI=0.68, 4.31). Thus, the interaction of perceived discrimination with perceived stress was statistically significant for the total sample, indicating that the three different perceived discrimination groups have differing regression slopes with the same level of perceived stress. Furthermore, as perceived stress increases for each perceived discrimination group so does one's depressive symptoms. Thus when perceived stress is constant, those who have "high discrimination" have a greater slope compared to those with "mild discrimination", while those with "no discrimination" have the smallest slope when comparing the regression lines.

Moderation Models: Ethnic Groups

Moderation Aim 4 & 5 (Table 12 and Figures 9 and 10)

The fourth aim of the study by ethnic group stratification showed that perceived stress did not interact with perceived discrimination to act as a protective factor against depressive symptoms when stratified by ethnic group (Figure 9). When stratified by ethnic group, the fifth aim of the study also was not statistically significant for Chinese and Koreans, but was for Vietnamese (Figure 10). Thus, the relationship inference for the aim five analysis for the Vietnamese sample was the same as the aim five inference for the total sample, showing that with increased perceived stress and increased discrimination, there is greater depressive symptoms. Figure 9 shows the differences in ethnic group interactions graphically. Koreans had minimal difference between the "mild discrimination" group and the "no discrimination" group when interacting with perceived

stress though not statistically significant, whereas the "high discrimination" group had a much steeper slope than both of the other two groups. Chinese and Vietnamese had similar graphs, though, the differences between the three discrimination groups was greatest in magnitude in the Vietnamese group.

Discussion

Key findings in this study were that mediation was statistically significant for aim one, two, and three for the total sample, with perceived stress having more of an impact on depressive symptoms than social support in a multiple mediator model with perceived discrimination as the predictor. The literature often centers on perceived social support as a moderator between perceived stress and depressive symptoms (Cohen & Wills, 1985), or as a mediator between perceived stress and depressive symptoms (Pearlin et al., 1981). Perceived social support is often studied as an intermediate variable, but not often studied as an intermediate variable between perceived discrimination and depressive symptoms. On the contrary, perceived stress is less commonly studied as an intermediate variable. Thus, this research sought to test both perceived social support and perceived stress as intermediate variables between perceived discrimination and depressive symptoms. Though perceived social support has shown to act as a buffer against perceived stress to reduce depressive symptoms (Pearlin et al., 1981), perceived social support as an intermediate variable between perceived discrimination and depressive symptoms has not been well studied. Our research identified that the finding that perceived social support and perceived stress both have mediating roles between perceived discrimination and depressive symptoms is plausible because who perceive discrimination often experience perceived stress, whereas those who perceive discrimination may not necessarily have

perceived social support. When stratified by ethnicity, both aim one and two were statistically significant. Only Koreans showed statistical significance for the multiple mediator model for both perceived social support and perceived stress, while Chinese and Vietnamese only showed significance for perceived stress in the multiple mediator model (aim three by ethnic group sub-analyses). Koreans may have exhibited perceived social support as a mediator unlike the Chinese and Vietnamese sample, because perceived social support has been shown to be an important construct to the Korean population although typically as a moderator (Choi, 1997).

Although past research has shown that perceived social support may act as moderator between perceived stress and depressive symptoms, this study found that perceived social support was not a statistically significant moderator in the relationship between perceived discrimination and depressive symptoms (aim four) in both the total sample and the ethnic sub-group analyses. However, there was statistical significance for perceived stress as a moderator (aim five) for the total sample and for the Vietnamese sample. It is unclear why perceived stress was only a moderator for the Vietnamese sample in the ethnic group sub-analyses and should be investigated again in future studies. Overall, the findings revealed that there are differences by ethnic group for both mediation and moderation for the relationship of perceived discrimination on depressive symptoms.

No known studies have tested if perceived social support and perceived stress act as mediators between the relationship of perceived discrimination and depressive symptoms. However, other potential mediators between perceived discrimination and depressive symptoms have been tested. For instance, a study of Korean American older

adults found that sense of control mediated the relationship between perceived discrimination and depressive symptoms (Jang, Chiriboga, Kim, & Rhew, 2010). Meanwhile, a study of African American youth showed that avoidant coping was a mediator in the relationship between perceived discrimination and depressive symptoms (Seaton, Upton, Gilbert, & Volpe, 2014). Another study that targeted Hispanic American adults showed that sleep disturbance mediated the association of perceived discrimination on depressive symptoms (Steffen & Bowden, 2006). Thus, testing if perceived social support or perceived stress mediates the relationship between perceived discrimination and depressive symptoms is added knowledge to the current literature.

Research has suggested that perceived discrimination may act as a stressor that results in increasing the vulnerability to illness of an individual (Gee et al., 2007). Specifically, studies have shown that there is a link between perceived discrimination and depressive symptoms (Bernstein et al., 2011; Mossakowski, 2003; Noh & Kaspar, 2003). Some researchers have identified possible moderators other than perceived social support or perceived stress between the relationship of perceived discrimination and depressive symptoms. For instance, a study of Asian international college students identified possible coping moderators and found that suppressive coping acts as a moderator of the relationship of perceived discrimination on depressive symptoms (Wei, Ku, Russell, Mallinckrodt, & Liao, 2008). Similarly, research by Noh et al. (1999) indicated that emotion-based coping reduces the association of perceived discrimination on depression among Southeast Asians. They also found that ethnic identification moderated the relationship between perceived discrimination and depressive symptoms; ethnic identity enhanced perceived discrimination's association to depressive symptoms (Noh et al.,

1999). The research by Noh and colleagues suggest that ethnic identification is significant in affecting the relationship between perceived discrimination and depressive symptoms. In a similar manner, our research sought to identify if Asian ethnic groups exhibited different relationships between perceived discrimination, perceived social support, perceived stress, and depressive symptoms. Overall, the literature of potential moderators of the relationship between perceived discrimination and depressive symptoms is lacking.

There is limited research on the constructs of perceived social support and perceived stress as a moderator to the relationship between perceived discrimination and depressive symptoms. However, there is some existing research that has hypothesized that perceived social support may act as a moderator in the relationship between perceived discrimination and depressive symptoms. Chae and colleagues (2010) have shown that perceived social support does buffer against poor mental health at lower levels of perceived discrimination among Asians. Chae et al.'s study is the only known study that explores this relationship among Asians and contradicts the findings found in this study. Our research examined this potential moderation by perceived social support and reported similar findings to research conducted in the African American population. A study conducted on African American college students found that perceived racial discrimination was related to higher depressive symptoms and lower social support, although moderation by the social support buffering hypothesis was not supported in the study (Prelow et al., 2006). As was found in our study, perceived social support did not moderate the relationship in the total sample, nor did it by ethnic group. Thus, the social support buffering hypothesis did not yield true in our study.

Findings from this study are novel. No known published research has compared these three Asian ethnic groups in a community-based sample to examine the proposed relationships outlined by the aims of this study. We sought to explore these posited relationships because perceived social support and perceived stress have been described as being related to perceived discrimination and depressive symptoms in the literature overall, but not in this specific pathway. Prior to this study, determining if perceived social support or perceived stress acts as a mediator and moderator between perceived discrimination and depressive symptoms had not been tested. Mechanisms to reduce stress should be studied to better understand how to minimize the perceived discrimination and depressive symptoms link among this population. The mediation of perceived social support was not as large as the mediation of aim one and should be investigated further in similar studies. This mediation analysis should be replicated in other ethnic populations and regions to determine if the findings are consistent with those that were found in this study.

Moderation should also be further explored in future studies. For example, this analysis should be replicated in other ethnic populations to determine if perceived social support and perceived stress act as moderators in the relationship between perceived discrimination and depressive symptoms. If perceived social support and perceived stress are not moderators in other populations, then other possible moderators should be tested such as ethnic identity, coping mechanisms, acculturation, and other constructs that have been identified in the literature. Understanding the pathways and the external factors that may attenuate or augment the relationship between perceived discrimination and

depressive symptoms can aid researchers in identifying what to focus on for prevention of depression efforts.

Although both mediation aims were supported and statistically significant, these analyses used data from a cross-sectional study and thus temporality cannot be established. In the absence of longitudinal data, causality can not be claimed from this study. Other limitations of this study include the convenience sampling in which participants voluntarily consented to participate at different recruitment venues. Because the parent study's primary focus was hepatitis B prevention and screening, the participants may represent a unique sample of foreign-born Asian adults who are particularly willing to consent to participate in a health study on a potentially stigmatizing subject which can result in selection bias. Additionally, the sample was recruited from the Baltimore-Washington metro area, in which a high population of foreign-born Asians, particularly, Chinese, Koreans, and Vietnamese reside. These cumulative factors make this sample population unlike the general population, thus generalizability is not achieved with this sample. Other limitations of this study include the measurement of each of the constructs, perceived discrimination, perceived stress, perceived social support, and depressive symptoms. Measurement error for each indicator of each construct is not accounted for when using Baron and Kenny's mediation steps, and thus this could result in an underestimation of the mediated effect. However, Baron and Kenny's mediation analysis is the most common method of mediation analysis in studies (MacKinnon, Fairchild, & Fritz, 2007).

Several strengths should be noted from this study. For instance, although the study population was drawn from a cross-sectional study and was a convenience sample,

the sample population was also a strength. The Baltimore-Washington metro area hosts some of the largest metropolitan populations of foreign-born Chinese, Korean, and Vietnamese in the U.S. Thus, the sample represented several communities of these three ethnic groups within the Baltimore-Washington metro area. As a result, this study sought to better understand a particular segment of the foreign-born Asian population, a subgroup that resides in or near a metropolitan area in a densely Asian populated region. Another strength of this study is that the parent study used a community-engaged method, with multilingual staff and translated materials being used in this study. As a result of the community-engaged approach, community members were especially active in the planning, and recruiting phases of the research which allowed for insight into how to gain access to these three populations within the community.

The principle strength to this study are the findings. Our study showed that perceived social support and perceived stress both act as mediators in the relationship between perceived discrimination and depression for three Asian ethnic groups, which has not been seen in other studies. Additionally, it showed that perceived stress acts as a moderator for the total sample and for the Vietnamese sample which also has not been seen in the literature. Most importantly, a major strength of this study is that it adds to the current body of knowledge on Asians in the U.S. by highlighting that differences by Asian ethnic groups may indeed exist. Specifically, it showcases that depressive symptoms among a sample of Asians are influenced by perceived discrimination, perceived social support, and perceived stress through different mechanisms based on one's ethnic group. This study sets the stage for future research that seeks to understand the mental health of Asians, specifically foreign-born Chinese, Korean, and Vietnamese

in the U.S. There is a need for more research that explores if ethnic level differences exist, particularly regarding mental health outcomes. Future studies should be conducted focusing on other Asian populations and other regions of the U.S. as well. Additionally, a comparison of foreign-born Asians to U.S.-born Asians could uncover differences by nativity status and should be conducted in the future.

The findings of this research emphasize the heterogeneity of the Asian population. As often described as the "model minority", this stereotype may in fact be promoting a false reality for some Asians since research here has once more displayed that differences do exist between Asian ethnic groups. Therefore, lumping all Asians into one group for research may result in interpreted findings that are skewed. This could result in poor translation of research into practice, which ultimately may lead to some Asian ethnic groups being misrepresented and possibly overlooked for services or care. Thus, understanding the fastest growing population's health issues such as their mental health issues requires an acknowledgement of the individualism of each ethnic group. Although similarities between Asian ethnic groups certainly exist, it should be noted by researchers and the public alike that ethnic level differences may have effects on health outcomes. Therefore, additional research as previously noted, as well as qualitative research is suggested so that a clearer picture of the factors that contribute to mental illness can be better seen. This study should implore researchers to critically assess ethnic differences not just in the Asian population, but within other ethnic subgroups of a "race" such as the Latino population. If differences between ethnic groups consistently appear in research, more studies at the community level targeting specific ethnic groups are warranted. Future studies of perceived social support and perceived stress as intermediate variables

in the relationship of perceived discrimination and depressive symptoms should be conducted in multiple Asian ethnic populations to build on the findings found in this study.

Table 5.1. Descriptive table of total sample of foreign-born Asians, N=600		
	n	%
Age (years)	47.31±11.82	Range: 18 - 91
Ethnicity	n=600	
Chinese	201	33.5
Korean	198	33.0
Vietnamese	201	33.5
Gender	n=600	
Male	252	42.0
Female	348	58.0
Education	n=595	
<High School	86	14.5
High School graduate	152	25.6
Vocational School/Some college	72	12.1
College graduate	160	26.9
Graduate school or higher	125	21.0
Employment	n=597	
Not Employed	199	33.3
Employed	398	66.7
Marital Status	n=599	
Married/living with a partner	472	78.8
Separated/Divorced/Widowed	50	8.4
Single	77	12.9
Family Income	n=585	
<$20K	150	25.6
$20K- <$50K	214	36.6
$50K- <$90K	112	19.2
$90K+	109	18.6
English Proficiency	n=600	
Fluent or Well	141	23.5
So So	234	39.0
Poor or Not at all	225	37.5
Self-rated General Health	n=599	
Excellent	50	8.35
Very good	124	20.7
Good	193	32.2
Fair	209	34.9
Poor	23	3.8
Self-rated Physical and Mental Health	Mean (SD)	Range
# of days in past 30 days that physical health was not good	n=579 3.4 (6.6)	0 - 30
# of days in past 30 days that mental health was not good	n=584 4.0 (6.6)	0 – 30

Table 5.2. Psychometrics of Discrimination (N=589), Perceived Stress (N=568), Perceived Social Support (and the Centers for Epidemiologic Studies Depression Scale (CES-D) Measures (N=585)						
Measure	N	# of items	Alpha	Mean	SD	Range
Discrimination	589	7	0.94	3.93	±5.16	0 - 35
Perceived Stress	565	10	0.73	25.54	±5.85	10 - 41
Perceived Social Support	581	8	0.94	29.07	±8.05	8 - 40
CES-D	585	20	0.83	11.66	±8.13	0 - 45

Table 5.3. Correlation matrix of predictors for multiple logistic regression with mean, SD, and range, N=532											
	1	2	3	4	5	6	7	8	Mean	SD	Range
1. Disc.	1.0000								3.93	5.16	0 - 35
2. PS	0.2532 ***	1.0000							25.54	5.85	10 - 41
3. PSS	-0.2148 ***	-0.4957 ***	1.000						3.63	1.01	1 - 5
4. Age	-0.0311 ***	0.0032	-0.1546 ***	1.0000					46.85	11.64	18 - 91
5. Gend.	0.0133	0.0708	0.0936	0.0325 *	1.0000				1.58	0.49	1 - 2
6. Ethn.	-0.1129 **	-0.0264	-0.0505	0.0661	-0.0406	1.0000			2.02	0.82	1 - 3
7. FI	0.1659	-0.0268	0.1335 **	0.0011	0.0025	-0.2822 ***	1.0000		2.31	1.05	1 - 4
8. EP	-0.0525	0.0689	-0.2200 ***	0.3131 ***	0.1112 **	0.2979 ***	-0.3292 ***	1.0000	2.13	0.77	1 - 3
Note: Disc is discrimination, PS is perceived stress, PSS is perceived social support, Gend is gender, Ethn is ethnicity, FI is family income, EP is English proficiency *p<.05, **p<.001, ***p<.001											

Table 5.4. Simple linear regressions with depressive symptoms as an outcome stratified by ethnic group						
	Chinese, N=190		Korean, N= 179		Vietnamese, N=182	
Variable	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value
Perceived Discrimination (PD)						
None (0 score)	Reference		Reference		Reference	
Mild (1 - 7 score)	2.30 (0.33, 4.27)	0.02*	1.06 (-1.86, 3.99)	0.47	2.98 (0.30, 5.66)	0.03*
High (8+ score)	3.39 (0.64, 6.13)	0.02*	5.67 (2.69, 8.64)	0.001***	7.35 (2.01, 12.70)	0.007**
Perceived Social Support (PSS)	-3.44 (-4.41, -2.47)	0.001***	-3.45 (-4.52, -2.39)	0.001**	-3.34 (-4.44, -2.24)	0.001***
Perceived Stress (PS)	0.74 (0.61, 0.87)	0.001***	0.92 (0.71, 1.13)	0.001***	0.74 (0.57, 0.91)	0.001***
*p<.05, **p<.001, ***p<.001						

Table 5.5. Testing for perceived social support as a mediator between perceived discrimination and an outcome of depressive symptoms using multiple regression, N=546			
Steps in testing for mediation	*B*	95% CI	Adjusted R^2
Testing Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.48***	0.35, 0.61	0.1058
Testing Step 2 (Path a) Outcome: perceived social support Predictor: perceived discrimination	-0.05***	-0.07 -0.04	0.1255
Testing Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived social support (Path b) Predictor: perceived discrimination (Path c')	 -3.13*** 0.31***	 -3.78, -2.48 0.19, 0.44	 0.2322
Total effect Indirect effect Direct effect	0.48*** 0.17*** 0.31***	-- -- --	-- -- --
Proportion of total effect mediated	0.35	--	--
*p<.05, **p<.001, ***p<.001			

Table 5.6. Testing for perceived stress as a mediator between perceived discrimination and an outcome of depressive symptoms using multiple linear regression, N=532			
Steps in testing for mediation	*B*	95% CI	Adjusted R^2
Testing Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.48***	0.35, 0.61	0.1070
Testing Step 2 (Path a) Outcome: perceived stress Predictor: perceived discrimination	0.31***	0.21, 0.40	0.0686
Testing Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived stress (Path b) Predictor: perceived discrimination (Path c')	0.72*** 0.26***	0.62, 0.81 0.15, 0.38	0.3571
Total effect Indirect effect Direct effect	0.48*** 0.22*** 0.26***	-- -- --	-- -- --
Proportion of total effect mediated	0.46	--	--
Note: *Adj.* R^2 is for the mean adjusted R^2 *p<.05, **p<.001, ***p<.001			

Table 5.7. Testing for perceived social support and perceived stress as mediators between perceived discrimination and an outcome of depressive symptoms using multiple linear regression, N=531		
Effects	*B*	95% CI
Total indirect effect	0.24***	0.16, 0.32
Indirect effect of perceived social support	0.06**	0.02, 0.09
Indirect effect of perceived stress	0.18***	0.12, 0.25
Total direct effect	0.22***	0.10, 0.33
Total effect	0.46***	--
Proportion of total effect mediated	0.53	--
*p<.05, **p<.001, ***p<.001		

Table 5.8. Testing for perceived social support as a mediator between perceived discrimination and an outcome of depressive symptoms using multiple linear regression by ethnicity			
Steps in testing for mediation: Chinese (N=182)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.26**	0.06, 0.46	0.1019
Step 2 (Path a) Outcome: perceived social support Predictor: perceived discrimination	-0.04**	-0.07, -0.02	0.0772
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived social support (Path b) Predictor: perceived discrimination (Path c')	-3.00*** 0.13	-4.00, -2.00 -0.06, 0.31	0.2476
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.26** 0.13** 0.13 0.52	-- -- -- --	-- -- -- --
Koreans (N=178)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.49***	0.30, 0.67	0.1541
Step 2 (Path a) Outcome: perceived social support Predictor: perceived discrimination	-0.07***	-0.09, -0.05	0.2505
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived social support (Path b) Predictor: perceived discrimination (Path c')	-2.69*** 0.30***	-3.89, -1.49 0.10, 0.50	0.2368
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.49*** 0.19*** 0.30*** 0.38	-- -- -- --	-- -- -- --
Vietnamese (N= 186)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.73***	0.32, 1.13	0.0499
Step 2 (Path a) Outcome: perceived social support Predictor: perceived discrimination	-0.05*	-0.02, -0.01	0.0480
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived social support (Path b) Predictor: perceived discrimination (Path c')	-3.34*** 0.56**	-4.50, -2.18 0.18, 0.94	0.1909
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.73*** 0.17* 0.56** 0.23	-- -- -- --	-- -- -- --
Note: *Adj.* R^2 is for the mean adjusted R^2 *p<.05, **p<.001, ***p<.001			

Table 5.9. Testing for perceived stress as a mediator between perceived discrimination and an outcome of depressive symptoms using multiple linear regression by ethnicity			
Steps in testing for mediation: Chinese (N=183)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.27**	0.07, 0.47	0.1108
Step 2 (Path a) Outcome: perceived stress Predictor: perceived discrimination	-0.20*	0.03, 0.38	0.0729
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived stress (Path b) Predictor: perceived discrimination (Path c')	0.68*** 0.13	0.54, 0.82 -0.03, 0.29	0.4196
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.27** 0.14* 0.13 0.51	-- -- -- --	-- -- -- --
Koreans (N=169)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.49***	0.29, 0.68	0.1554
Step 2 (Path a) Outcome: perceived stress Predictor: perceived discrimination	-0.26***	0.14, 0.38	0.1336
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived stress (Path b) Predictor: perceived discrimination (Path c')	0.74*** 0.30***	0.52, 0.96 0.11, 0.48	0.3308
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.49*** 0.19*** 0.30*** 0.39	-- -- -- --	-- -- -- --
Vietnamese (N= 180)	*B*	95% CI	Adjusted R^2
Step 1 (Path c) Outcome: depressive symptoms Predictor: perceived discrimination	0.71***	0.31, 1.12	0.0530
Step 2 (Path a) Outcome: perceived stress Predictor: perceived discrimination	0.42*	0.12, 0.72	0.0159
Step 3 (Path b and c') Outcome: depressive symptoms Mediator: perceived stress (Path b) Predictor: perceived discrimination (Path c')	0.72*** 0.41*	0.55, 0.89 0.06, 0.76	0.3142
Total effect Indirect effect Direct effect Proportion of total effect mediated	0.71*** 0.30** 0.41* 0.42	-- -- -- --	-- -- -- --
Note: *Adj.* R^2 is for the mean adjusted R^2 *p<.05, **p<.001, ***p<.001			

Table 5.10. Testing for perceived social support and perceived stress as mediators between perceived discrimination and an outcome of depressive symptoms using multiple linear regression by ethnicity		
Effects (Chinese= 176)	*B*	95% CI
Total indirect effect	0.16**	0.03, 0.29
Indirect effect of perceived social support	0.02	-0.01, 0.06
Indirect effect of perceived stress	0.14*	0.02, 0.26
Total direct effect	0.08	-0.08 0.24
Total effect	0.24*	--
Proportion of total effect mediated	0.66	--
Effects (Korean= 168)	*B*	95% CI
Total indirect effect	0.23***	0.11, 0.36
Indirect effect of perceived social support	0.10*	0.02, 0.18
Indirect effect of perceived stress	0.14**	0.05, 0.23
Total direct effect	0.22*	0.03, 0.40
Total effect	0.45*	--
Proportion of total effect mediated	0.52	--
Effects (Vietnamese=175)	*B*	95% CI
Total indirect effect	0.29**	0.07, 0.51
Indirect effect of perceived social support	0.06	-0.03, 0.14
Indirect effect of perceived stress	0.24**	0.05, 0.42
Total direct effect	0.41*	0.10, 0.33
Total effect	0.70*	--
Proportion of total effect mediated	0.42	--
*p<.05, **p<.001, ***p<.001		

Table 5.11. Multiple linear regressions testing perceived social support and perceived stress as moderators between perceived discrimination and depressive symptoms while adjusting for age, gender, ethnicity, family income, and English proficiency among total sample		
Perceived Social Support as Moderator	Adjusted, N=546	
Variable	Coefficient (95% CI)	p-value
Perceived Discrimination (PD)		
None (0 score)	Reference	
Mild (1 - 7 score)	1.49 (0.08, 2.91)	0.04*
High (8+ score)	3.03 (1.08, 4.98)	0.002**
Perceived Social Support (PSS)	-3.35 (-4.29, -2.42)	0.001***
PDXPSS Interaction		
None (0 score)	Reference	
Mild (1 - 7 score)	0.29 (-1.09, 1.67)	0.68
High (8+ score)	0.23 (-1.52, 1.98)	0.80
Perceived Stress as Moderator	Adjusted, N=532	
Variable	Coefficient (95% CI)	p-value
Perceived Discrimination (PD)		
None (0 score)	Reference	
Mild (1 - 7 score)	1.64 (0.36, 2.93)	0.01**
High (8+ score)	2.49 (0.68, 4.31)	0.007**
Perceived Stress (PS)	0.59 (0.47, 0.72)	0.001***
PDXPS Interaction		
None (0 score)	Reference	
Mild (1 - 7 score)	0.26 (0.04, 0.48)	0.02*
High (8+ score)	0.23 (0.19, 0.84)	0.002**
*p<.05, **p<.001, ***p<.001		

Table 5.12. Multiple linear regressions testing perceived social support and perceived stress as moderators between perceived discrimination and depressive symptoms while adjusting for age, gender, ethnicity, family income, and English proficiency stratified by ethnic group

Perceived Social Support as Moderator	Chinese Adjusted, N=182		Korean Adjusted, N=178		Vietnamese Adjusted, N=186	
Variable	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value
Perceived Discrimination (PD)						
None (0 score)	Reference		Reference		Reference	
Mild (1 - 7 score)	0.91 (-1.10, 2.92)	0.37	0.41 (-2.50, 3.31)	0.78	1.97 (-0.77, 4.70)	0.16
High (8+ score)	0.50 (-2.22, 3.22)	0.72	2.61 (-0.56, 5.77)	0.11	7.18 (1.36, 13.01)	0.02*
Perceived Social Support (PSS)	-2.77 (-4.31, -1.23)	0.001***	-3.96 (-6.49, -1.43)	0.002**	-3.42 (-4.85, -1.99)	0.001***
PDXPSS Interaction						
None (0 score)	Reference		Reference		Reference	
Mild (1 - 7 score)	-0.09 (-2.22, 2.03)	0.93	1.64 (-1.42, 4.70)	0.29	-0.75 (-3.33, 1.82)	0.56
High (8+ score)	-0.41 (-3.47, 2.65)	0.79	0.53 (-2.57, 3.64)	0.74	3.56 (-1.73, 8.85)	0.19
Perceived Stress as Moderator	Chinese Adjusted, N=183		Korean Adjusted, N=169		Vietnamese Adjusted, N=180	
Variable	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value	Coefficient (95% CI)	p-value
Perceived Discrimination (PD)						
None (0 score)	Reference		Reference		Reference	
Mild (1 - 7 score)	1.35 (-0.34, 3.04)	0.12	0.23 (-2.56, 3.01)	0.87	2.32 (-0.15, 4.78)	0.07
High (8+ score)	1.04 (-1.26, 3.35)	0.37	2.02 (-1.09, 5.14)	0.20	-0.03 (-6.11, 6.04)	0.99
Perceived Stress (PS)	0.55 (0.37, 0.73)	0.001***	0.72 (0.36, 1.07)	0.001***	0.56 (0.36, 0.75)	0.001***
PDXPS Interaction						
None (0 score)	Reference		Reference		Reference	
Mild (1 - 7 score)	0.22 (-0.07, 0.51)	0.13	-0.03 (-0.54, 0.49)	0.92	0.64 (0.20, 1.07)	0.004**
High (8+ score)	0.42 (-0.06, 0.90)	0.09	0.37 (-0.18, 0.92)	0.19	1.35 (0.24, 2.46)	0.02*

*p<.05, **p<.001, ***p<.001

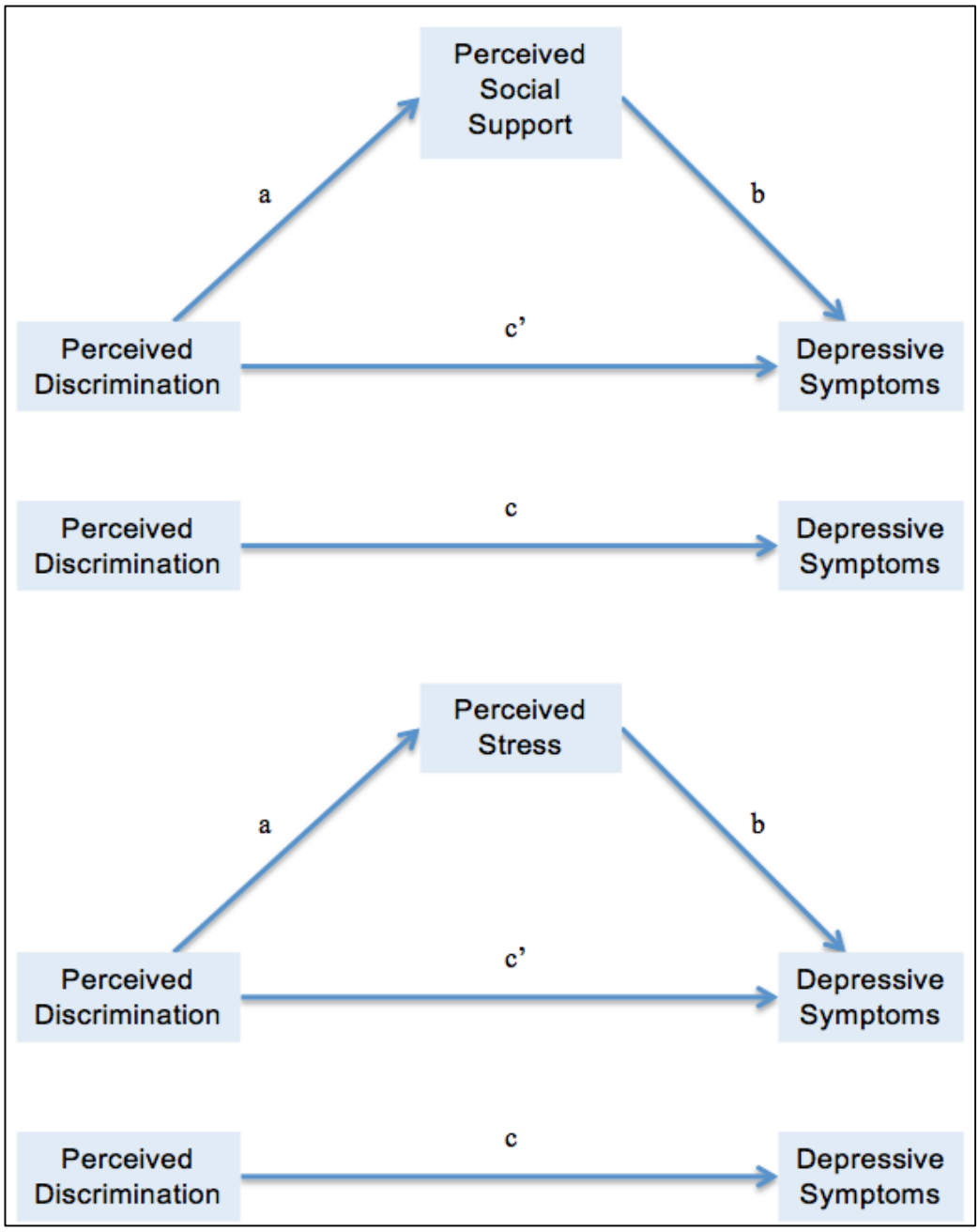


Figure 5.1. Perceived social support and perceived social support as a mediator between perceived discrimination and depressive symptoms. This figure illustrates the three paths of mediation, where a is path a (step 2), b is path b (step 3), c' is path c' (step 3), and c is path c (step 1).

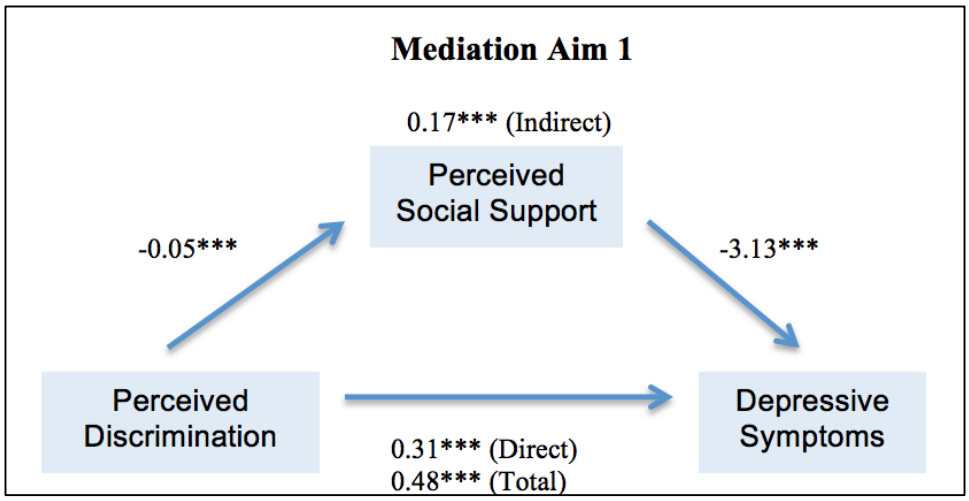


Figure 5.2. Mediation Aim 1: Perceived social support as a mediator between perceived discrimination and depressive symptoms among the total sample

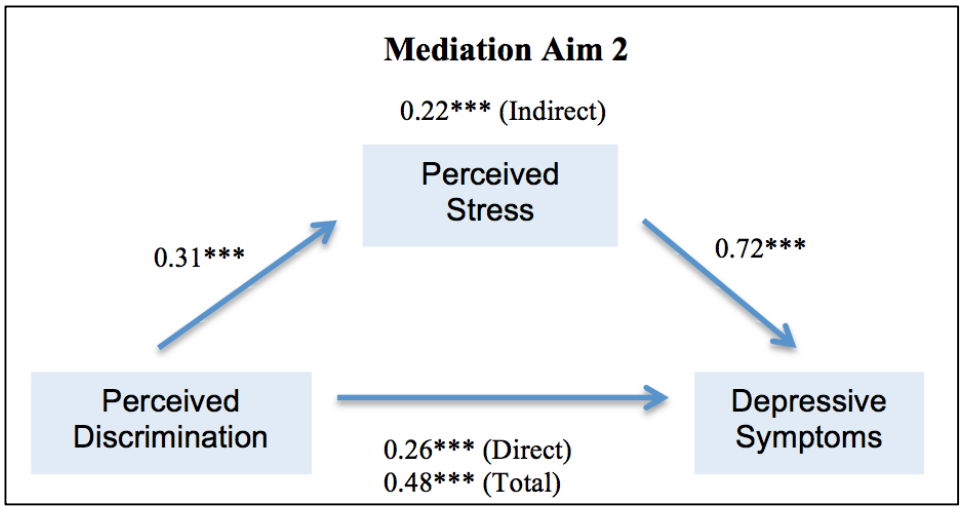


Figure 5.3. Mediation Aim 2: Perceived stress as a mediator between perceived discrimination and depressive symptoms among the total sample

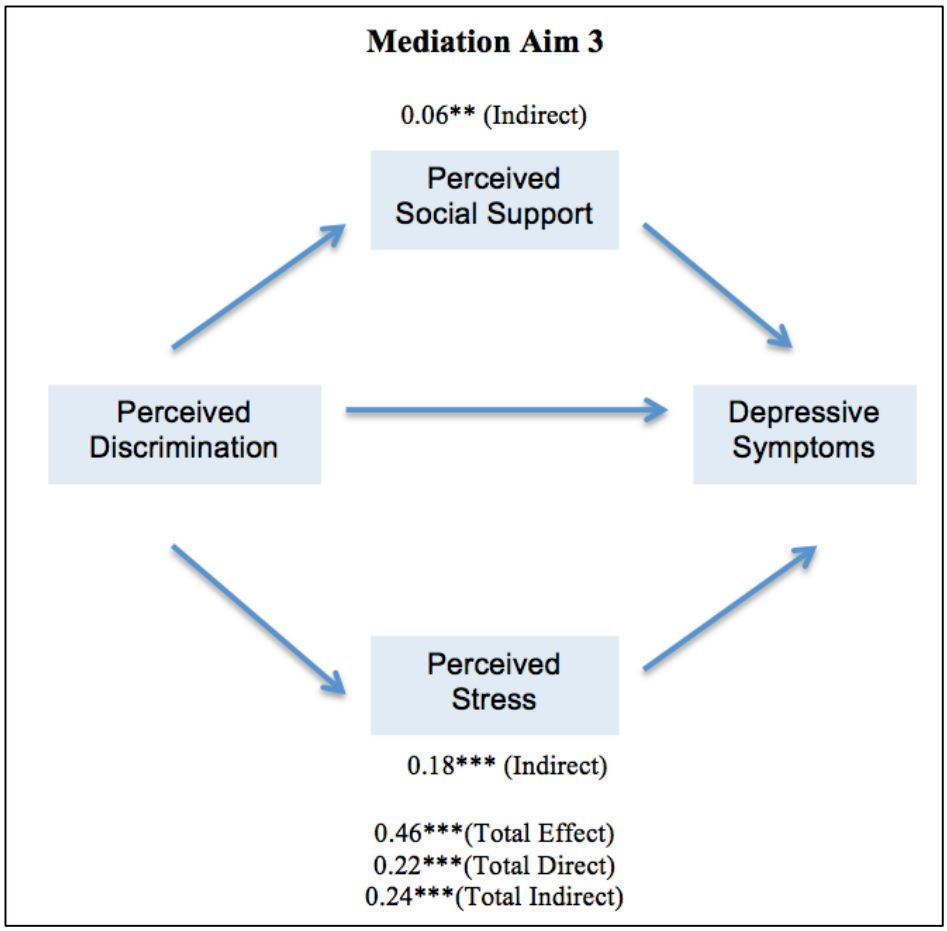


Figure 5.4. Mediation Aim 3: Perceived social support and perceived stress as multiple mediators between perceived discrimination and depressive symptoms among the total sample

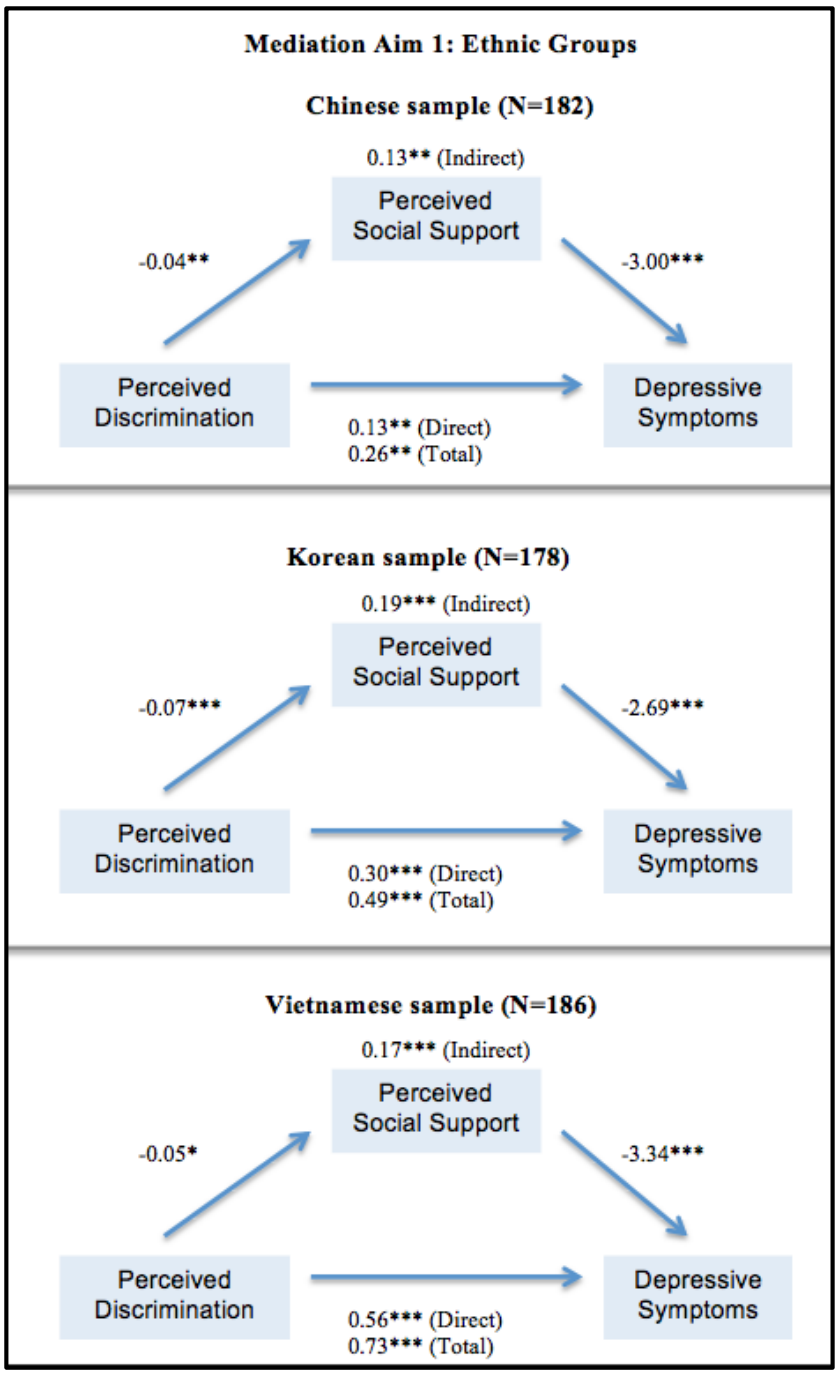


Figure 5.5. Mediation Aim 1: Perceived social support as a mediator between perceived discrimination and depressive symptoms stratified by ethnic group

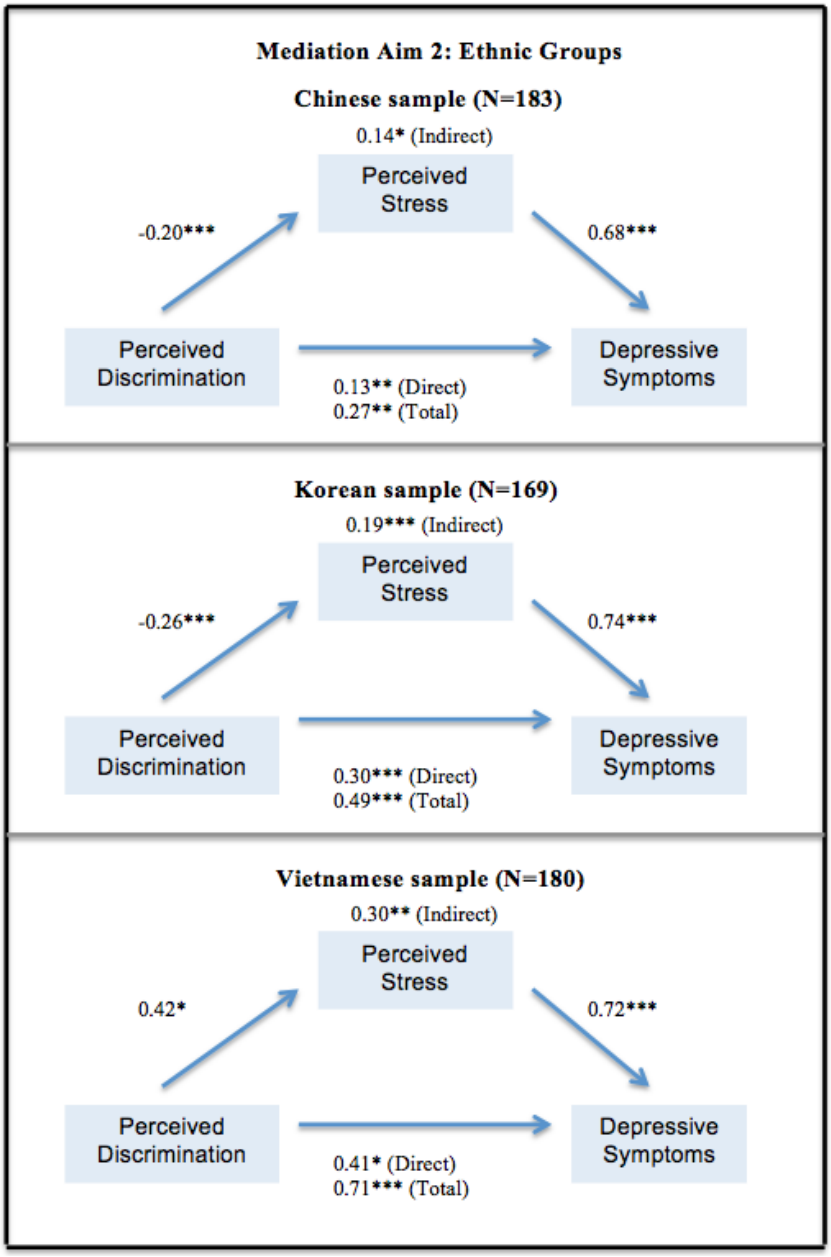


Figure 5.6. Mediation Aim 2: Perceived stress as a mediator between perceived discrimination and depressive symptoms stratified by ethnic group

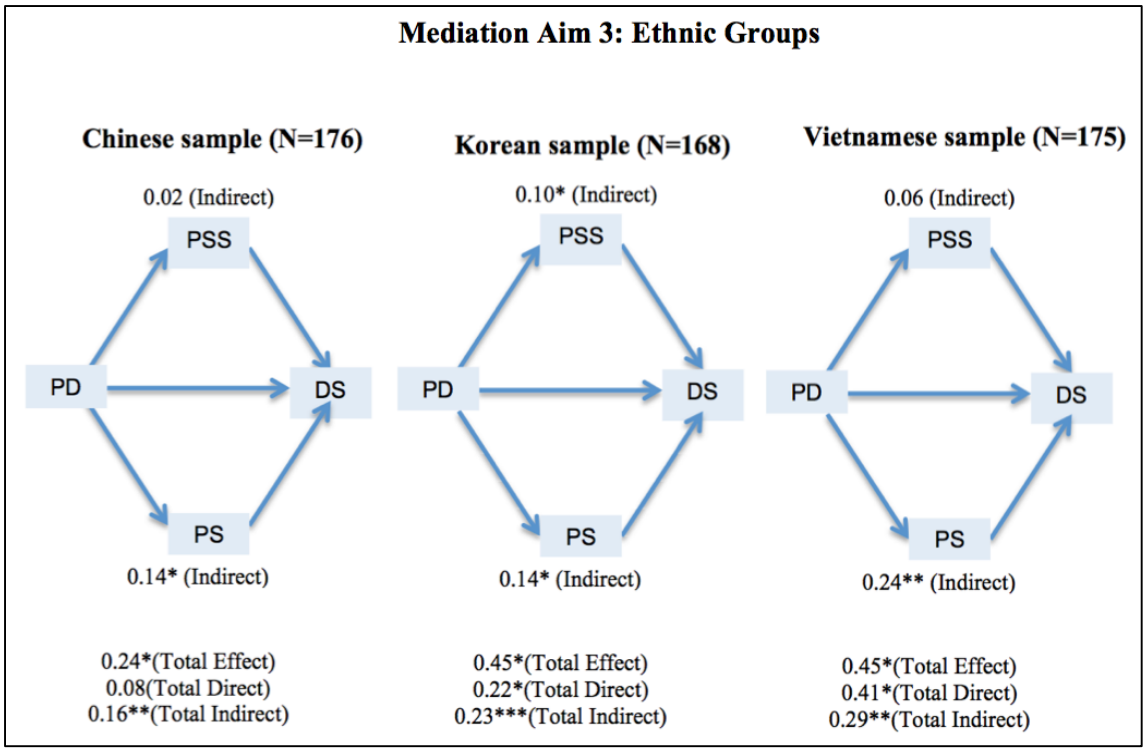
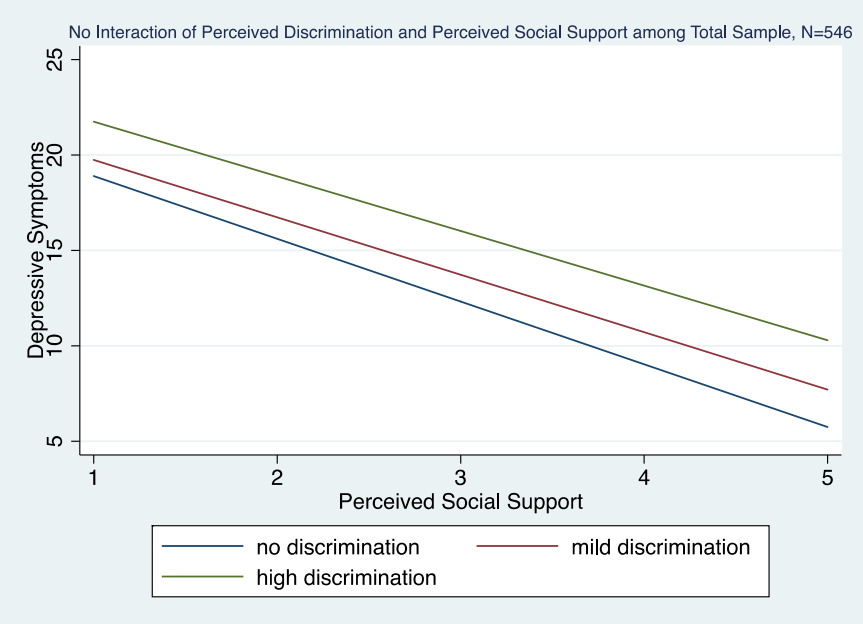


Figure 5.7. Mediation Aim 3: Perceived social support (PSS) and perceived stress (PS) as multiple mediators between perceived discrimination (PD) and depressive symptoms (DS) stratified by ethnic group

Moderation Aim 4



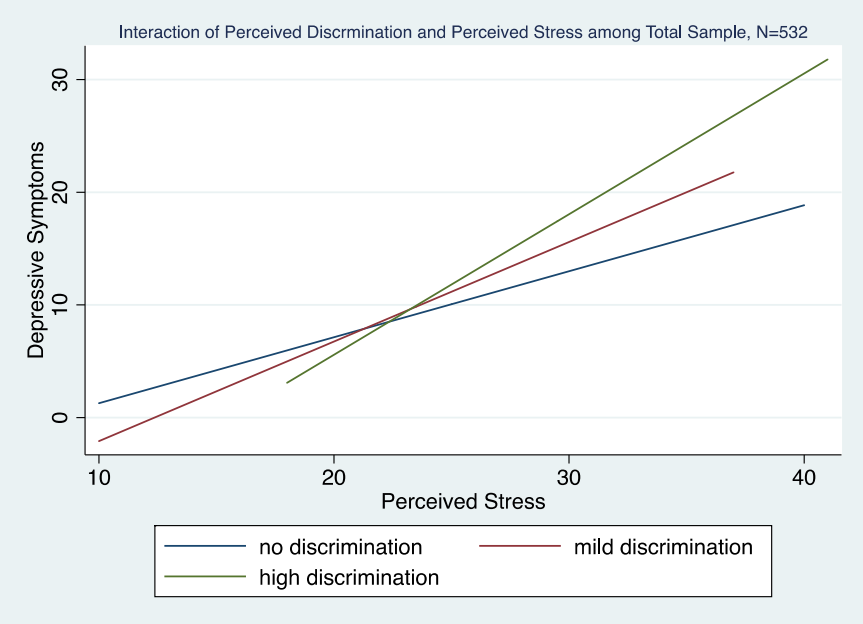
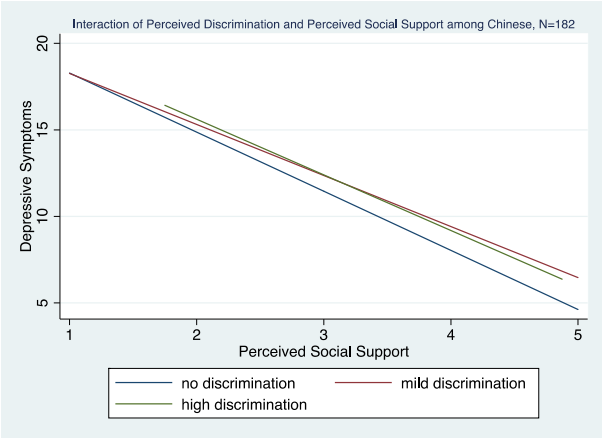
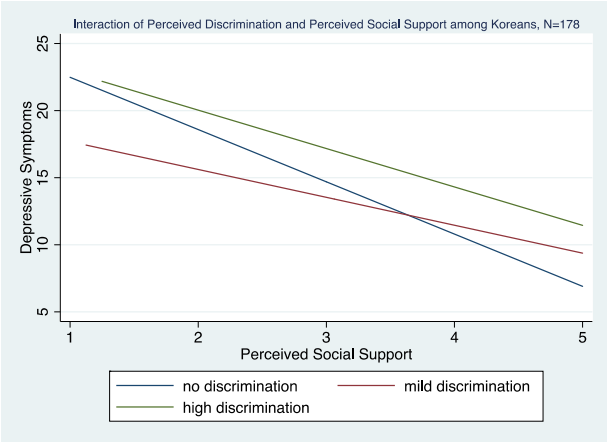


Figure 5.8. Moderation Aim 4 & 5: Perceived social support and perceived stress as moderators between perceived discrimination and depressive symptoms among the total sample

Moderation Aim 4: Ethnic Groups





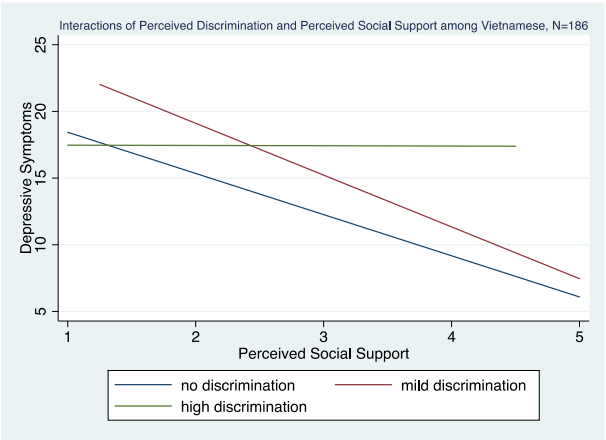
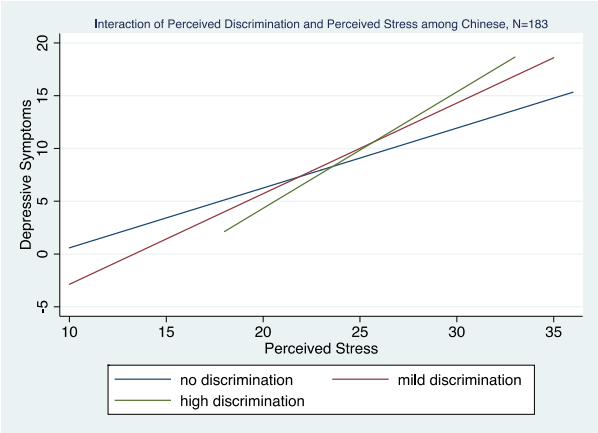
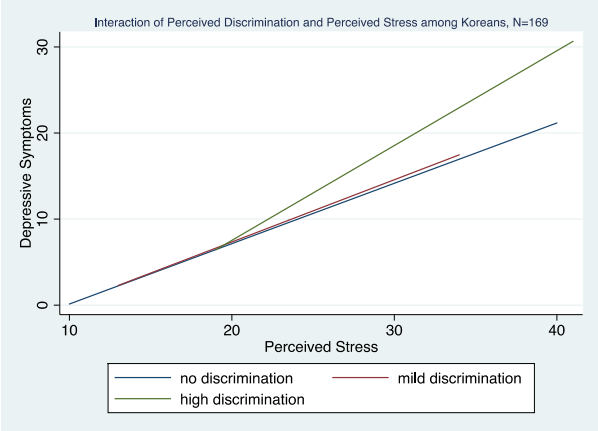


Figure 5.9. Moderation Aim 4: Perceived social support as a moderator between perceived discrimination and depressive symptoms among stratified by ethnic group

Moderation Aim 5: Ethnic Groups





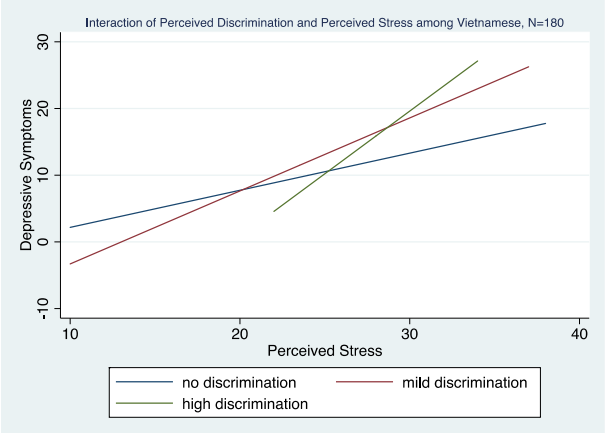


Figure 5.10. Moderation Aim 5: Perceived stress as a moderator between perceived discrimination and depressive symptoms among stratified by ethnic group

CHAPTER SIX: DISCUSSION

Overview

The goal of this dissertation is to better understand the current state of mental health among the Asian population in the U.S. Though there is some research on the Asian population in the U.S., there is much more research to be done. The Asian population consists of a widely diverse group of people, which adds complexity to understanding a population that consists of many different cultures, languages, and beliefs. This research sought to examine the depressive symptoms among a foreign-born Asian population living in a densely populated region of foreign-born Asians, specifically of Chinese, Korean, and Vietnamese descent living in the U.S. In addition, the research used multiple logistic regressions and multiple linear regressions to determine if perceived discrimination, perceived stress, and perceived social support influenced depressive symptoms among a sample of this population while accounting for other sociodemographic factors.

This discussion chapter focuses on a summary of findings of the three manuscripts. Following the summary of findings is a description of the study limitations and strengths of the dissertation, research and policy implications, and lastly overall conclusions from the research.

Summary of Findings

Manuscript one

Manuscript one was written as a critical review of the current state of mental health among the Asian population in the U.S. It first provided basic background to the overall Asian population in the U.S., and then focused on foreign-born Asians of

Chinese, Korean, and Vietnamese ancestry. This first manuscript discussed immigration and depression in the U.S among the Chinese, Korean, and Vietnamese. The next portion of the manuscript described current prevalence of mental illness among the target population. An overview of two national datasets specific to mental illness, the National Latino and Asian American Study (NLAAS) and the National Survey on Drug Use and Health (NSDUH), were presented. Next was a summary of the depression literature among Asians specific to studies that used the CES-D to capture depressive symptoms. The last section discussed the low utilization of mental health services among the target population and posed current challenges to improving the research in this field. It concluded with recommendations to improve the research with hopes of developing more effective interventions to reduce mental illness.

This manuscript brought to the forefront the many integral pieces of research that are needed for good research to exist, and how there is much more to be accomplished to reach this goal in the field of Asian mental health. Though progress has been achieved in the Asian community towards a better understanding of the Asian population's mental illness and help-seeking behaviors, there is still much that is unknown or uncertain in the research community. Inconsistencies in prevalence estimates of mental illness abound, with notable differences between national and community-based samples. Additionally, the Asian population is known to include a myriad of cultures and languages. Specifically, the foreign-born population may have different reasons for migrating to the U.S. Thus, interpreting data on social factors that affect an Asian foreign-born sample require caution prior to generalizing findings from an Asian sample to represent all people with an Asian background. This critical review asserts that research suggests that

some Asian populations may have a high prevalence of depression when assessed using the CES-D, and that there indeed may be a need for services for this population. The "model minority" title that is often given to the Asian population may indeed be proving to be untrue and more detrimental than good to this population.

Manuscript Two

Thesis aim 1: To determine if perceived discrimination is associated with depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

Manuscript two presented data from a quantitative analysis using data from a parent study of 600 foreign-born Asian adults from a large metropolitan area. The study sought to examine if ethnic groups would have statistically significantly different proportions of those who are depressed when compared by ethnic group. Additionally, it sought to examine if statistical significance would be achieved when comparing perceived discrimination prevalence estimates by ethnic group. Of primary interest, the study sought to establish if perceived discrimination was associated with depressive symptoms, and secondly, if this relationship differed by ethnic group.

The Chinese were used as the reference group in this analysis, and findings indicated that Koreans were statistically significantly different than Chinese for depressive symptoms, but Vietnamese were not. The Korean population had 34% of the population that scored a 16 or higher (assessed as depressed), with 21% for Chinese, and 24% for Vietnamese. The estimates for the construct of "perceived discrimination" were statistically significantly different when comparing ethnic groups for both of the variables of perceived discrimination – "discrimination" and "unfair treatment". The ethnic group with the most participants reporting "discrimination" was Koreans, followed by Chinese

in second, and Vietnamese in last. However, for "unfair treatment", the ethnic group that reported the most "unfair treatment" was Chinese, while Koreans reported the second most, and Vietnamese again had the least amount of "unfair treatment" reported.

Perceived discrimination (both variables) was statistically significantly related to depressive symptoms for the whole sample of 600, as well as by ethnic group in a stratified analysis. The more episodes of perceived discrimination were associated with higher odds of being depressed for the total sample, as well as by ethnic group. Thus, all three objectives of this study were met in this study and supported.

Additional intriguing findings include that gender had no statistical significant association to depressive symptoms for the Vietnamese population. Overall, this study added to the perceived discrimination broader literature, the Asian depression literature, and the foreign-born research literature for Asians. These study results provided a first step to exploring if potential mediators or moderators exist between perceived discrimination and depressive symptoms by establishing that perceived discrimination is associated with depressive symptoms among a foreign-born Asian community-based sample.

Manuscript Three

Thesis aim 2: To determine if perceived social support and perceived stress partially mediates the relationship between perceived discrimination and depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

Thesis aim 3: To determine if perceived social support and perceived stress moderates the relationship between perceived discrimination and depressive symptoms among the foreign-born Chinese, Korean, and Vietnamese population.

Manuscript three included five analyses by total sample and by ethnic group to fulfill the thesis aim two and three. Five manuscript aims were identified to answer thesis aim two and three and were:

1. To determine if perceived social support partially mediates the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

2. To determine if perceived stress partially mediates the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

3. To determine if perceived social support and perceived stress act as multiple mediators in the relationship between perceived discrimination and depressive symptoms among an Asian foreign-born sample.

4. To determine if perceived social support interacts with perceived discrimination to moderate the association of perceived discrimination on depressive symptoms among an Asian foreign-born sample.

5. To determine if perceived stress interacts with perceived discrimination to moderate the association of perceived discrimination on depressive symptoms among an Asian foreign-born sample.

The three mediation aims of perceived social support and perceived stress were statistically significant by total sample, but only the Korean group showed statistical significance for the multiple mediator model aim (aim 3). Perceived stress mediated the relationship between perceived discrimination and depressive symptoms more than perceived social support did as a mediator. The second part of the manuscript three was to determine if perceived social support and perceived stress acted as a moderator between perceived discrimination and depressive symptoms. Perceived social support was not significant as a moderator in the total sample model, however perceived stress was a significant moderator in the total sample. The perceived social support moderation model was not statistically significant by ethnic group analyses. The perceived stress moderation model was statistically significant for only the Vietnamese sample when stratified by ethnic group. Thus, differences exist by Asian ethnic group.

Overall, manuscript three tested three mediating hypotheses, and two moderating hypotheses. This research was novel in that it tested relationships that were not yet tested in other studies, and not yet tested in a community-based sample of foreign-born Chinese, Korean, and Vietnamese population.

Study Limitations

Cross-sectional design

There are several limitations to this dissertation research. Foremost, the study uses cross-sectional data from a parent study. Thus, the research discussed in this dissertation is drawn from a one point in time data collection. Thus, the predictors and the outcome do not show any form of temporality. In other words, the study can not state causality that perceived discrimination resulted in depressive symptoms, as it could be that depressive

symptoms leads to perceived discrimination. Thus, only associations can be firmly asserted from this research. Although a case for directionality can be made, these data can only support a theory and can not confirm causality.

Sampling methods

Other limitations to the dissertation revolve around the sampling methods used for the parent study. The data used was a nonprobability sample, therefore it is not a random sample. Specifically, it is a purposive non-proportional quota sample of 600 foreign-born Asians, roughly of equal proportion by each of the ethnic groups. Because it is not a random sample, one cannot generalize the findings to the general Asian foreign-born population in the U.S. However, an equal proportion of participants per ethnic group allows for comparisons by ethnic group. Lastly, those who agreed to participate in the parent study were consenting to have their blood drawn for a Hepatitis B screening and liver cancer prevention study. Thus, the participants are a particular type of people who are willing to answer potentially personal questions and have their blood drawn. These individuals may not represent the typical group of foreign-born Chinese, Korean, and Vietnamese people.

Bias

As with any study, there are biases from measurement error in this research that should be noted. Both systematic error and random error are a concern for all research, and are described here.

Systematic Error

There are several study design biases that could affect the results of this study. Related to study design, there are both instances of selection bias and information bias. An example of selection bias is non-response bias and participation bias. In this study, those who do not respond may be different from those who do respond to the study. Because the outcome of interest for this research is depression, there should be caution in interpreting the results because it is known that those who are severely depressed are likely to be withdrawn and may not be attending social activities. Since recruitment was done in public spaces, it is unlikely that individuals could be out in public, and if so, open to participate in such a study. Therefore, an underestimation of "depressed" participants could have occurred in the recruitment of participants. Participation bias could occur among those who attend church, could likely have more social support. And as a whole, those who participated describe a group of people willing to take time and effort in a health study with a potentially stigmatizing topic.

Information bias also occurs due to study design. In particular, response bias may have occurred due to participants answering questions in a biased manner. For example, with this study and with other studies with sensitive topics respondents may answer in a pleasing manner for fear of negative judgment by others. Thus, this social desirability bias may skew the results to be more favorable than what is true. Therefore, for this research, any potentially stigmatizing topics may be underestimated, such as depression estimates. Another form of social desirability bias may be that participants answer in the way they believe is most favorable for the researcher. There are a couple scenarios that could have occurred to alter results. For instance, participants may have overestimated

perceived discrimination because they could believe that if the researcher is asking about it, then the researcher must expect it to occur. Another perspective of social desirability bias in this research is if participants underreport perceived discrimination because they want to be perceived as equals to others and accepted by others. Thus, with any self-administered questionnaire that includes sensitive topics, it is difficult to ascertain if responses are completely honest.

Random Error

Unlike systematic error, where the bias occurs across the entire sample population, the random error also must be acknowledged. In this research, random error is of concern because it is a cross-sectional study. Thus data was collected at one-time point. Participants different moods could have influenced their answer choices, which could particularly skew results for the CES-D questions. Additionally, participants were recruited throughout a year's time, so different recruitment days or venues could have affected responses due to external factors.

Construct Validity

Another potential concern is construct validity. Primarily two threats to construct validity should be noted from this research. With the exception of perceived discrimination, each construct had one measure used to assess each concept. Each measure could only be capturing part of each concept. Additionally, another threat to construct validity is the lack of accounting of measurement error for each item of each measure in the mediational analysis. The Baron and Kenny analysis methods do not account for this and because of this the findings could be underestimated. Thus, the

constructs may not be accurately capturing all components to each concept. However, each measure was carefully selected for the study and has been successfully used in other populations and was pilot tested among the population.

Generalizability

A limitation of this research is that external validity to the general population is not achieved from this research. Firstly, this study has eligibility requirements that restricts this Asian population to be non-representative the general Asian population. Two primary restrictions are that the Asian population targeted are foreign-born and must be of one of three Asian ethnicities. As noted earlier, this results in this study being unable to be generalized to the national population.

Study Strengths

There are several strengths to this dissertation. These strengths predominantly relate to the study design of the parent study and to the findings of the dissertation research. Two strengths of the study design are the sample population and the community-engaged approach employed in the parent study.

The sample population is a strength because of three primary reasons. Firstly, the sample population was foreign-born. As noted previously, foreign-born Asians contribute a substantial proportion of the total Asian population in the U.S. Also, the Asian population continues to grow in the U.S., and thus a greater understanding of this population is warranted. Secondly, the sample population purposely includes three of the largest ethnic groups of Asians in the U.S., Chinese, Koreans, and Vietnamese. Thus, a better understanding of three of the most common Asian ethnic groups is achieved.

Thirdly, the sample population was drawn from a metropolitan region in the U.S. with dense populations of each of the ethnic groups. Therefore, because there was a high density of these three ethnic groups, the ability to quota sample was possible to allow for ethnic comparisons. Thus, the sample population included 200 Asian participants per ethnic group, which resulted in a total of 600 participants for the total sample. This is a substantive sample size for a community-based sample. Thus, these three aspects of the sample population are a strength to the study because the Asian population is typically understudied and this research ensures that part of the Asian population is captured in a methodologically sound way.

A second strength to the study design is that the parent study included and engaged the community. The community-engaged approach allowed for community members to participate throughout the research process. A community advisory board was created in the parent study to ensure that community members were included in each step of the research. In addition, the research team for the parent study were multidisciplinary, multiethnic, and multilingual. This allowed for each ethnic group to be represented in the community and research team. Similarly, the questionnaire (pre-test) was translated into each native language for each ethnic group so that participants had the option to complete the questionnaire in their native tongue or in English.

The other strengths of the dissertation are related to the findings of the research. There is no known mental health study that targets a foreign-born Asian sample of Chinese, Korean, and Vietnamese adults in the U.S. Additionally, no known study sought to examine the relationships between perceived discrimination, perceived stress, perceived social support, and depressive symptoms among an Asian population. This

research is valuable because each manuscript aim of the two quantitative papers were completed and most of the aims were supported. In summary, the findings of the quantitative component of the research provided the following using a total sample of foreign-born Asian adults and using separate sub-samples of Chinese, Korean, and Vietnamese:

1) estimates of depressive symptoms (thesis aim 1)
2) estimates of perceived discrimination (thesis aim 1)
3) estimates of perceived discrimination's association to depressive symptoms (thesis aim 1)
4) estimates of perceived social support as a mediating variable between perceived discrimination and depressive symptoms (thesis aim 2)
5) estimates of perceived stress as a mediating variable between perceived discrimination and depressive symptoms (thesis aim 2)
6) estimates of perceived social support and perceived stress as multiple mediators between perceived discrimination and depressive symptoms (thesis aim 2)
7) estimates of perceived social support as a moderating variable on perceived discrimination's influence on depressive symptoms (thesis aim 3)
8) estimates of perceived stress as a moderating variable on perceived discrimination's influence on depressive symptoms (thesis aim 3)

Overall, this research showed that estimates were high for depressive symptoms among this sample of foreign-born Asians. Also, perceived discrimination was associated with depressive symptoms, with mediators and moderators affecting this relationship. Additionally, each analyses showed that

differences exist by ethnic group stratification and suggests that future ethnic group sub-analyses among Asians should be conducted in research. All in all, a major strength of this research lies in the effort to highlight a population that is often overlooked under the guise of the "model minority" title. This research seeks to inspire other researchers to further investigate the mental health of all types of Asian populations.

Research Implications

This dissertation provides interesting findings and acts as a stepping stone for research in this field. Improvements to research of the Asian population can be made and learned from this research. First, more interest and funding to research focused on Asian populations should be garnered. This includes studies that concentrate on foreign-born individuals, multiple ethnic groups, and other social factors. Next steps for future research include replication of this study in other foreign-born Chinese, Korean and Vietnamese samples as well as in other ethnic Asian samples. As noted previously, sampling was both a limitation and strength. Future studies should ensure that recruitment occurs for the entire sample population as standardized and matched as possible between recruitment venues. Additionally, future studies could use multiple measures for each construct of interest to improve construct validity. Also, future research should attempt to use structural equation modeling (SEM) to account for the measurement error per individual item if possible. However, many assumptions must be met for SEM to be feasible, and thus may be difficult to achieve with numerous measures and constructs included in the model. In addition to quantitative improvements, research in this field should include qualitative studies. Qualitative research could provide better

insight into other factors that may influence depressive symptoms. Likewise, qualitative research could allow for a better delineation of each construct by ethnic group. In-depth interviews may provide better understanding in the migration experience for foreign-born individuals and how this may affect one's depressive symptoms. Also, qualitative research could provide nuanced information that is difficult to ascertain from quantitative studies. Overall, there is much still to be understood regarding the Asian population and their mental health. In order for better policies and treatment to be implemented and available to populations, a concerted effort to understand who the Asian population is in research is needed.

Policy and Programmatic Implications

Policy and programmatic changes can be enforced to improve the research and clinical care of Asians in the U.S. For instance, standardization of measures and data collection procedures for national surveys is needed to enable comparisons by ethnic groups. The ACA requires national surveys to provide answer choices for specific Asian ethnic groups. This is a first step in allowing for disaggregated data at the national level. In order to gain a fuller picture of each ethnic group, this requires that all national data use the same "race" question as proposed by the ACA. This same racial categorization for the "Asian" race should be used as best possible in community-based samples when sample sizes are large enough to do so.

Clinical implications from this research include understanding key avenues to improve prevention and care of Asians with mental illness. Of primary interest, this research highlights the idea that there is a population of Asians that may be susceptible to mental illness and that may not seek care. Thus, efforts to improve prevention and

treatment are needed. Firstly, language barriers should be lessened between patients and providers. This can be done by increasing clinical workforce that speaks Asian languages, increasing educational health information that is translated in Asian languages, and increasing the clinical workforce's knowledge of Asian customs and beliefs which could improve patient provider satisfaction.

Other ways to improve prevention and treatment of Asians with mental illness is to have better screening. Research has shown that few peoples seek help from mental health services, but that when care is sought, it often is from the primary care physicians (Pescosolido & Boyer, 1999). Thus, the primary care physician is the first line of defense against mental illness in the health care world. Thus, primary care physicians have a teachable moment for diagnosis. Regular screenings and monitoring for depression should be implemented in primary care practices. Particularly because Asians are often reported as describing somatic symptoms, misdiagnosis or overlooking signs of potential mental illness could occur.

Overall, manuscript one has emphasized that mental health services are often underutilized in the Asian population. This is partially because the Asian population may not interpret mental health in the same way as Western societies conceptualize it. Similarly, mental illness is often negatively perceived by cultures, particularly Asian cultures resulting in stigma and a delay in help-seeking (Eisenberg, Downs, Golberstein, & Zivin, 2009; Ting & Hwang, 2009). Likewise, shame is inflicted on individuals within a family in certain Asian cultures. The shame of disappointing one's family in collectivistic cultures could be a major deterrent in seeking mental health services (Jang, Chiriboga, & Okazaki, 2009). As a result, this research reiterates that there is a need to

increase help-seeking of mental health services by Asians with mental illness. Therefore, campaigns to reduce stigmatizing and shaming of individuals with mental illness is important, as well as promoting alternate forms of treatment. Because mental health services may not align with traditional East Asian beliefs, other methods to provide services and care to Asians is needed. For example, mindfulness meditation may be a possible beneficial prevention mechanism for those with high perceived stress (Chu & Sue, 2011). Mindfulness meditation has roots from Buddhism and Eastern traditions and subsequently may already align with the beliefs of some Asian individuals.

This dissertation revealed the importance of perceived social support and perceived stress. Thus, efforts to increase perceived social support and reduce perceived stress are in need. For college populations, Asian student groups could be a source of social support and meetings for these groups could be used for courses or interventions on reducing perceived stress and perceived discrimination. Meanwhile for general Asian populations, community centers or churches could be valuable places to provide social support and venues for learning to reduce perceived stress.

Conclusions

The current state of Asian mental health is not often given priority in research or the government. However, this may be shifting. This past year in 2015, the first White House Initiative on Asian Americans and Pacific Islanders (WHIAPPI) Summit was convened in Washington, D.C. and brought together researchers, practitioners, and policymakers from across the U.S. states and territories. This meeting had a priority to acknowledge the progress of Asians in the U.S. today, and the gaps and lack of progress that still exists for Asians in all facets of America today. Therefore, this research is

timely in that it seeks to continue this agenda to improve the health and life of all Asians in the U.S. A lack of standardization in the "race" category, heterogeneity of the Asian "race", and lack of standardization of measures in mental health research in general results in vague and mixed findings on this topic and population. Consequently, more research is needed to provide a clearer picture of the various Asian populations.

Particularly, this dissertation contributes to the current literature on Asian populations in the U.S. This research added to the body of knowledge by selecting a sample of foreign-born Asians from a highly dense region of Chinese, Korean, and Vietnamese immigrants. Key findings from this research include that perceived discrimination is associated with depressive symptoms among the sample population, and that differences by ethnic group exist. Future studies should investigate why these differences may exist. Secondly, mediation occurs in two separate paths. The first mediation that was supported was that perceived social support mediated the path between perceived discrimination and depressive symptoms. The second mediation that was supported was that perceived stress mediated the path between perceived discrimination and depressive symptoms. Therefore, of value would be to learn how to increase perceived social support to reduce depressive symptoms and how to reduce perceived stress to then reduce depressive symptoms.

As a whole, there is much to be done in the field of Asian mental health in the U.S. There is a need to establish a consensus on the average prevalence of depression for Asian ethnic groups, as well as the need to give care to those in need of treatment for mental illness. More research on how to persuade Asian populations to seek care and maintain treatment for mental illness is necessary. There is a great need to

alleviate and reduce mental illness in all populations, but there is a greater duty to reach those vulnerable subpopulations that may be overlooked such as the Asian population. This dissertation sought to highlight these issues that quietly burden the Asian population and is written as one of hopefully many more research studies to come focusing on these issues.

APPENDICES

Appendix A. Coding of Variables

Appendix A.1. Description of all variables in Manuscript Two

Variable	**Coding**
CES-D (outcome)	0 “not depressed”, 1 “depressed”
Discrimination	1 “none” (score of 0), 2 “mild discrimination” (score of 1 – 7) , 3 “high discrimination (score of 8+)
Unfair Treatment	1 “none”, 2 “any unfair treatment”
Age	1 “18 – 39 years old”, 2 “40 – 59 years old”, 3 “60 years or older”
Gender	1 “male”, 2 “female”
Ethnicity	1 “ Chinese”, 2 “Korean”, 3 “Vietnamese”
Family Income	1 “ <$20,000”, 2 “$20,000 - <$50,000”, 3 “50,000 - <$90,000, 4 “$90,000 or more”
English Proficiency	1 “fluent or well”, 2 “so so”, 3 “poor or not at all”

Appendix A.2. Description of all variables in Manuscript Three

Variable	**Coding**
CES-D (outcome)	0 - 60
Perceived Discrimination	0 – 35 for mediational analyses 1 “none” (score of 0), 2 “mild discrimination” (score of 1 – 7) , 3 “high discrimination” (score of 8+) for moderation analyses
Perceived Social Support	1 - 5
Perceived Stress	0 - 50
Age	1 “18 – 39 years old”, 2 “40 – 59 years old”, 3 “60 years or older”
Gender	1 “male”, 2 “female”
Ethnicity	1 “ Chinese”, 2 “Korean”, 3 “Vietnamese”
Family Income	1 “ <$20,000”, 2 “$20,000 - <$50,000”, 3 “50,000 - <$90,000, 4 “$90,000 or more”
English Proficiency	1 “fluent or well”, 2 “so so”, 3 “poor or not at all”

Appendix B. Measures

Appendix B.1. CES-D

Below is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the **past week**? [Please circle **one** number on each line]				
During the past week . . .	Rarely or none of the time (less than one day)	Some or a little of the time (1 – 2 days)	Occasionally or a moderate amount of time (3 – 4 days)	Most or all of the time (5 – 7 days)
1. I was bothered by things that usually don't bother me	0	1	2	3
2. I did not feel like eating; my appetite was poor	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family	0	1	2	3
4. I felt that I was just as good as other people	0	1	2	3
5. I had trouble keeping my mind on what I was doing	0	1	2	3
6. I felt depressed	0	1	2	3
7. I felt that everything I did was an effort	0	1	2	3
8. I felt hopeful about the future	0	1	2	3
9. I thought my life had been a failure	0	1	2	3
10. I felt fearful	0	1	2	3
11. My sleep was restless	0	1	2	3
12. I was happy	0	1	2	3
13. I was less than usual	0	1	2	3
14. I felt lonely	0	1	2	3
15. People were unfriendly	0	1	2	3
16. I enjoyed life	0	1	2	3
17. I had crying spells	0	1	2	3
18. I felt sad	0	1	2	3
19. I felt people disliked me	0	1	2	3
20. I could not "get going"	0	1	2	3

Appendix B.2. Discrimination

The following questions apply to your experiences in the U.S. In your life, how often do the following things happen to you? [Please check one for each statement]						
	Never	Less than once a year	A few times a year	A few times a month	At least once a week	Almost every day
1. How often are you insulted, called names, or harassed because of your race or ethnicity?	0	1	2	3	4	5
2. How often are you disrespected or treated rudely by others because of your race or ethnicity?	0	1	2	3	4	5
3. How often are you treated unfairly because you speak with an accent or because the way people assume you speak English?	0	1	2	3	4	5
4. How often have you been treated badly because people perceive that you are an immigrant?	0	1	2	3	4	5
5. How often do people make negative stereotypes about you based on your race or ethnicity?	0	1	2	3	4	5
6. How often do you receive poorer service at stores or restaurants because of your race or ethnicity?	0	1	2	3	4	5
7. How often do people act as if they're better than you are because of your race or ethnicity?	0	1	2	3	4	5

Appendix B.3. Unfair Treatment

Think about whether any of the following has happened to you in the U.S. because of any of the following reasons:

- Because of your race or ethnicity,
- Because of the way people think you speak English or because you speak English with an accent, or
- Because people think you are an immigrant or not a US citizen

	Never	Once	Twice	Three times or more
1. Not hired for a job, denied a promotion or fired?	0	1	2	3
2. Prevented from moving into a neighborhood because the landlord or realtor refused to sell or rent you a house or apartment?	0	1	2	3
3. Received lower quality medical care?	0	1	2	3
4. Unfairly denied education or discouraged by a teacher or advisor?	0	1	2	3

Appendix B.4. Perceived Social Support

Here is a list of some things that other people do for us or give us that may be helpful or supportive. Please read each statement carefully and mark one that is closest to your situation in each row. [Please circle **one** number on each line]					
	Much less than I would like	Less than I would like	Some, but would like more	Almost as much as I would like	As much as I would like
1. I have people who care what happens to me	1	2	3	4	5
2. I get love and affection	1	2	3	4	5
3. I get chances to talk to someone about problems at work or with my housework	1	2	3	4	5
4. I get chances to talk to someone I trust about my personal or family problems	1	2	3	4	5
5. I get chances to talk about money matters	1	2	3	4	5
6. I get invitations to go out and do things with other people	1	2	3	4	5
7. I get useful advice about important things in life	1	2	3	4	5
8. I get help when I am sick in bed	1	2	3	4	5

Appendix B.5. Perceived Stress

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please mark how often you felt or thought a certain way. Choose the answer that best matches your situation. Please remember that I am only asking about how you felt **in the last month**. [Please circle **one** number on each line]

	Never	Almost never	Sometimes	Fairly Often	Very Often
1. How often have you been upset because of something that happened unexpectedly?	1	2	3	4	5
2. How often have you felt that you were unable to control the important things in your life?	1	2	3	4	5
3. How often have you felt nervous and "stressed"?	1	2	3	4	5
4. How often have you dealt successfully with irritating life hassles?	1	2	3	4	5
5. How often have you felt that you were effectively coping with important changes that were occurring in your life?	1	2	3	4	5
6. How often have you felt confident about your ability to handle your personal problems?	1	2	3	4	5
7. How often have you felt that things were going your way?	1	2	3	4	5
8. How often have you found that you could not cope with all the things that you had to do?	1	2	3	4	5
9. How often have you been able to control irritations in your life?	1	2	3	4	5
10. How often have you felt that you were on top of things?	1	2	3	4	5

Appendix C. Additional analyses for Manuscript Two

Appendix C.1. Interactions table for discrimination

Table 4.10. Multiple logistic regressions interaction estimates of discrimination and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data					
	n=600			Interaction, n=600	
Variable	OR (95% CI)	p-value	Interaction Variable	OR (95% CI)	p-value
Discrimination			D X Age (years)		
None (0 score)	Reference		None X 18 – 39	Reference	
Mild (1 - 7 score)	2.07 (0.69, 6.26)	0.20	Mild X 40 – 59	1.21 (0.34, 4.30)	0.77
High (8+ score)	8.76 (2.51, 30.59)	0.001***	Mild X 60 and older	1.55 (0.27, 9.04)	0.63
Age (years)			High X 40 – 59	0.63 (0.16, 2.56)	0.52
18 - 39	Reference		High X 60 and older	1.01 (0.10, 9.65)	1.00
40 - 59	1.62 (0.60, 4.36)	0.34			
60 and older	0.87 (0.24, 3.19)	0.83			
Discrimination			D X Gender		
None (0 score)	Reference		None X Male	Reference	
Mild (1 - 7 score)	2.25 (0.96, 5.27)	0.06	Mild X Female	1.20 (0.42, 3.43)	0.73
High (8+ score)	6.99 (2.70, 18.07)	0.001***	High X Female	0.88 (0.28, 2.78)	0.83
Gender					
Male	Reference				
Female	1.75 (0.78, 3.93)	0.17			
Discrimination			D X Ethnicity		
None (0 score)	Reference		None X Chinese	Reference	
Mild (1 - 7 score)	3.21 (1.28, 8.03)	0.01**	Mild X Korean	0.62 (0.15, 2.50)	0.50
High (8+ score)	5.96 (2.01, 17.70)	0.001***	Mild X Vietnamese	0.77 (0.24, 2.51)	0.67
Ethnicity			High X Korean	1.02 (0.24, 4.40)	0.98
Chinese	Reference		High X Vietnamese	1.12 (0.20, 6.22)	0.90
Korean	1.76 (0.55, 5.64)	0.34			
Vietnamese	1.32 (0.54, 3.24)	0.55			

Appendix C.1. Interactions table for discrimination (continued)

Table 4.10. Multiple logistic regressions interaction estimates of discrimination and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data

	n=600			Interaction, n=600	
Variable	OR (95% CI)	p-value	Interaction Variable	OR (95% CI)	p-value
Discrimination			D X Family Income		
None (0 score)	Reference		None X $0 - <$20,000	Reference	
Mild (1 - 7 score)	3.65 (1.52, 8.74)	0.004**	Mild X $20,000 - <$50,000	0.58 (0.18, 1.87)	0.36
High (8+ score)	17.80 (4.86, 65.25)	0.001***	Mild X $50,000 - <$90,000	0.41 (0.10, 1.73)	0.23
Family Income			Mild X $90,000 or more	0.60 (0.09, 3.84)	0.59
$0 - <$20,000	Reference		High X $20,000 - <$50,000	0.34 (0.07, 1.55)	0.16
$20,000 - <$50,000	0.90 (0.38, 2.12)	0.81	High X $50,000 - <$90,000	0.18 (0.03, 0.98)	0.05*
$50,000 - <$90,000	1.16 (0.38, 3.57)	0.79	High X $90,000 or more	0.20 (0.02, 1.79)	0.15
$90,000 or more	0.45 (0.09, 2.28)	0.34			
Discrimination			D X English Proficiency		
None (0 score)	Reference		None X Fluent or Well	Reference	
Mild (1 - 7 score)	3.57 (0.89, 14.33)	0.07	Mild X So So	0.78 (0.16, 3.82)	0.76
High (8+ score)	6.29 (1.42, 27.81)	0.02*	Mild X Poor or Not at all	0.57 (0.12, 2.73)	0.48
English Proficiency			High X So So	1.14 (0.21, 6.33)	0.88
Fluent or Well	Reference		High X Poor or Not at all	1.05 (0.18, 6.09)	0.95
So So	2.70 (0.70, 10.47)	0.15			
Poor or Not at all	2.19 (0.58, 8.24)	0.25			

Note: Each interaction depicts a separate model that controlled for all covariates. D is discrimination.
*p<.05, **p<.001, ***p<.001

Appendix C.2. Interactions table of unfair treatment

Table 4.11. Multiple logistic regressions interaction estimates of unfair treatment and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data					
	n=600			Interaction, n=600	
Variable	OR (95% CI)	p-value	Interaction Variable	OR (95% CI)	p-value
Unfair Treatment			UT X Age (years)		
None (0 score)	Reference		None X 18 – 39	Reference	
Any (1+ score)	3.59 (1.31, 9.89)	0.01**	Any X 40 – 59	0.82 (0.26, 2.59)	0.74
Age (years)			Any X 60 and older	0.32 (0.05, 1.84)	0.20
18 - 39	Reference				
40 - 59	1.57 (0.85, 2.89)	0.15			
60 and older	1.15 (0.49, 2.69)	0.74			
Unfair Treatment			UT X Gender		
None (0 score)	Reference		None X Male	Reference	
Any (1+ score)	2.21 (1.06, 4.60)	0.04	Any X Female	1.39 (0.55, 3.50)	0.49
Gender					
Male	Reference				
Female	1.54 (0.96, 2.48)	0.08			
Unfair Treatment			UT X Ethnicity		
None (0 score)	Reference		None X Chinese	Reference	
Any (1+ score)	2.22 (1.03, 4.81)	0.04*	Any X Korean	1.22 (0.41, 3.66)	0.72
Ethnicity			Any X Vietnamese	1.52 (0.49, 4.70)	0.46
Chinese	Reference				
Korean	2.16 (1.10, 4.24)	0.03*			
Vietnamese	0.96 (0.50, 1.84)	0.91			

Appendix C.2. Interactions table of unfair treatment (continued)

Table 4.11. Multiple logistic regressions interaction estimates of unfair treatment and covariates with outcome of depressed (CES-D 16+ score) or not (CES-D 0 – 15 score), N=600, multiple imputed data

Variable	n=600 OR (95% CI)	p-value	Interaction Variable	Interaction, n=600 OR (95% CI)	p-value
Unfair Treatment			UT X Family Income		
None (0 score)	Reference		None X $0 - <$20,000	Reference	
Any (1+ score)	3.27 (1.19, 8.99)	0.02*	Any X $20,000 - <$50,000	0.77 (0.22, 2.68)	0.007**
Family Income			Any X $50,000 - <$90,000	0.50 (0.11, 2.22)	0.36
$0 - <$20,000	Reference		Any X $90,000 or more	1.41 (0.32, 6.27)	0.66
$20,000 - <$50,000	0.63 (0.35, 1.12)	0.12			
$50,000 - <$90,000	0.75 (0.38, 1.50)	0.42			
$90,000 or more	0.24 (0.09, 0.64)	0.004**			
Perceived Unfair Treatment			UT X English Proficiency		
None (0 score)	Reference		None X Fluent or Well	Reference	
Any (1+ score)	2.25 (0.83, 6.13)	0.11	Any X So So	1.20 (0.35, 4.10)	0.78
English Proficiency			Any X Poor or Not at all	1.35 (0.37, 4.94)	0.65
Fluent or Well	Reference				
So So	2.50 (1.16, 5.37)	0.02*			
Poor or Not at all	1.53 (0.70, 3.38)	0.29			

Note: Each interaction depicts a separate model that controlled for all covariates. UT is unfair treatment.
*p<.05, **p<.001, ***p<.001

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CURRICULUM VITAE

Victoria Chau, MPH, CPH

PERSONAL

Date of birth: March 20, 1985
Location of birth: Philadelphia, Pennsylvania, USA

EDUCATION

Johns Hopkins University

Doctor of Philosophy, Public Health *(Aug. 2012 – May 2016)*
Johns Hopkins Bloomberg School of Public Health
Department of Health, Behavior and Society

Health Certificate, Health Communication *(Completed June 2014)*
Health Certificate, Public Mental Health Research *(Completed May 2015)*

Advisors: Hee-Soon Juon, PhD, MSN and Janice Bowie, PhD, MPH

University of Florida

Master of Public Health, Social and Behavioral Sciences *(Jan. 2009 – Dec. 2010)*
Department of Behavioral Science and Community Health
College of Public Health and Health Professions

Bachelor of Arts, Anthropology *(Aug. 2003 – May 2007)*
College of Liberal Arts and Sciences
Minor: Art History, Pre-med

PUBLIC HEALTH RESEARCH INTERESTS AND COMPETENCIES

Specific interests: mental health, health disparities, minority health, health communication, health policy, global health, and tobacco prevention/cessation

- Proficient in Microsoft Word, PowerPoint, Excel, Stata14
- Basic knowledge of SPSS, MPLUS, UCINET, ArcGIS

PUBLIC HEALTH EXPERIENCE AND RESEARCH

Johns Hopkins Bloomberg School of Public Health

Lighthouse Studies at Peer Point Data Analyst *(May 2015 – present)*
Analyzing baseline data from a National Institute on Drug Abuse funded study on the impact of neighborhoods, networks, and depression on drug users' HIV risk, and beginning to prepare a manuscript for peer review publication

Mindfulness in a College Population Research Assistant *(Aug. 2013 – present)*
Bloomberg School of Public Health & JHU School of Medicine
Recruited students, conducted in-depth interviews among a small sample of undergraduate students, transcribed interviews, and currently assisting in writing a manuscript regarding a mindfulness-based stress reduction program in an undergraduate population

Lay Health Worker Model to Reduce Liver Cancer Disparities in Asian Americans Research Assistant *(Aug. 2013 – May 2014)*
Bloomberg School of Public Health, & University of Maryland School of Public Health
Attended weekly research team meetings, received lay health worker training, aided in project tasks, and completed data entry for a Hepatitis B screening and prevention project

Center for Communication Programs Malawi project Research Assistant
(*Jan. – May 2013)*
Conducted univariate and bivariate analysis, and contributed to writing a report on contraceptive use among women in Malawi

CLEAR Campaign Team Member (*Jan. – May 2013)*
Worked as a team member to create, implement, and evaluate a health communication campaign that promoted practicing mindfulness to reduce stress among Bloomberg School of Public Health students

University of Florida College of Public Health and Health Professions

Environmental Health and Public Health Research Intern - "Break the Cycle 5" Project *(Jan. 2010 – Apr. 2010)*
University of Florida Center for Health Equity and Quality Research (CHEQR), Duval County Health Department (DCHD), and the Southeast Pediatric Environmental Health Specialty Unit (PEHSU)
Compiled references for manuscripts, assisted in grant tasks, completed and reviewed IRB forms, attended collaborative CHEQR/DCHD meetings, conducted literature reviews of mercury exposure in women, developed mercury exposure education survey, administered surveys via telephone, analyzed data, & presented findings to the SE PEHSU BTC 5 Conference as the student participant from the University of Florida

Bone Marrow Transplant Caregiver Study Research Assistant *(Jan. 2009 – Dec. 2009)*
University of Florida Hematology/Oncology and the National Marrow Donor Program
Coordinated with the principle investigator to solely administer the assembling of caregiver toolkits, dissemination of toolkits, interviewing of participant caregivers, and completion of the data entry, clean up, and qualitative coding

El Salvador Public Health Outreach Trip Team Member *(May 2009)*
Assessed & promoted the health of a community in extreme poverty, El Limon, El Salvador by taking community members' blood pressure, conducting house assessments, developing sanitation games with the local children, creating a health and hygiene women's committee within El Limon, and establishing relationships between various community stakeholders to engage in the health of El Limon

PUBLICATIONS AND PRESENTATIONS

Chau, V, Bowie, J. & Juon, H-S. (Expected April 2016). *Perceived discrimination's influence on depressive symptoms among foreign-born Chinese, Korean, and Vietnamese Americans.* Poster presentation at the Society of Behavioral Medicine annual meeting at the Washington Hilton, Washington, D.C.

Chau, V. (December 2014). *Policies for poverty: Education policy.* Lecture presented to the Health, Poverty, and Public Policy graduate class at Johns Hopkins University School of Public Health, Baltimore, MD.

Chau, V. (November 2013). *Inequality and health.* Lecture presented to the Health, Poverty, and Public Policy class at Johns Hopkins University School of Public Health, Baltimore, MD.

Chau, V., King, M., Taylor, S., Vargas, G., Chin, C., & Bajaj, P. (May 2013). CLEAR presentation given to the Johns Hopkins School of Public Health students, Baltimore, MD.

Chau, V., Betsy, A., & Siconolfi, D. (December 2012). *Social proof and social norms.* Doctoral lecture presented to the 2012 – 2013 second term Persuasive Communications class at Johns Hopkins University School of Public Health, Baltimore, MD.

Chau, V., Traynor, S., Lukens-Bull, K., Pawlowicz, G., Tucker-Disney, G., Hilliard, A., & Wood, D. (2011). Mercury Exposure Education Provided by Women's Health Clinics in Duval County, Florida. *Reviews on Environmental Health, 26,* (3), 197-204.

Chau, V. (May 2010). Southeast Pediatric Environmental Health Specialty Unit (SE PEHSU) Break the Cycle presentation on Mercury Exposure Education given at the SE PEHSU conference in Atlanta, Georgia.

MEETINGS AND CONFERENCES

Society of Behavioral Medicine 37th Annual Meeting
First Author, Poster Presentation
Society of Behavioral Medicine
Washington Hilton, Washington, D.C.

White House Initiative on Asian Americans & Pacific Islanders Summit *(May. 2015)*
Attendee
White House Initiative on Asian Americans & Pacific Islanders (WHIAPPI)
George Washington University, D.C.

Health, Behavior and Society Second Year Doctoral Student Research Retreat *(Feb. 2014)*
Co-Coordinator & Participant
Department of Health, Behavior and Society, Bloomberg School of Public Health
Legg Mason Building, Baltimore, MD

Depression Among Asian Americans: Culture-Specific Prevention and Intervention Strategies Conference *(April 2013)*
Attendee
New Jersey Asian American Association for Human Services
Edison, New Jersey

2012 mHealth Summit *(Dec. 2012)*
Attendee & Student Scholar
Healthcare Information and Management Systems Society
The Gaylord National Resort and Convention Center, National Harbor, Maryland

Annual American Public Health Association Conference *(Oct. – Nov. 2009)*
Attendee
American Public Health Association
Philadelphia Convention Center, Philadelphia, PA

Southeast Pediatric Environmental Health Specialty Unit (SE PEHSU) Break the Cycle Conference *(May 2010)*
Student Presenter & Participant
Southeast Pediatric Environmental Health Specialty Unit and Emory University
Emory University, Atlanta, Georgia

TEACHING ASSISTANTSHIPS

A New View: Improving Public Health Through Innovative Social and Behavioral Tools and Approaches *(June 2013, June 2014, June 2015)*
Health, Behavior and Society Summer Institute course
Instructor: Paul Gaist, PhD, MPH

Health, Poverty, and Public Policy *(Nov. – Dec. 2013, Nov. – Dec. 2014)*
Health, Behavior and Society second term course
Instructor: Carol Underwood, PhD, MA

AWARDS AND CERTIFICATIONS

Certified in Public Health (CPH) *(Feb. 2011, Renewed until Dec. 2017)*

Health certificate in Public Mental Health Research, Johns Hopkins Bloomberg School of Public Health *(May 2015)*

Health certificate in Health Communication, Johns Hopkins Bloomberg School of Public Health
(June 2014)

2012 mHealth Summit Student Scholar *(Dec. 2012)*

Delta Omega (National Public Health Honorary Society) Inductee *(April 2011)*